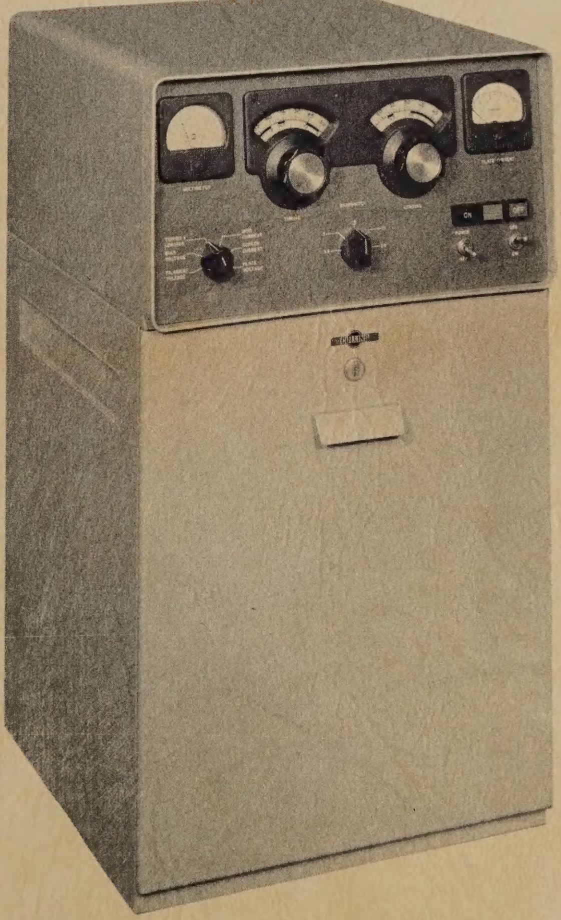
INSTRUCTION BOOK

R-F LINEAR AMPLIFIER

30S-1



COLLINS RADIO COMPANY

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The Collins Amateur equipment described herein is sold under the following guarantee:

Collins agrees to repair or replace, without charge, any equipment, parts, or accessories which are defective as to design, workmanship, or materials, and which are returned to Collins at its factory, transportation prepaid, provided:

(a) Buyer has completed and returned to Collins promptly following his purchase the Registration Card included in the Instruction Book furnished with the equipment.

(b) Notice of the claimed defect is given Collins within 90 days from the date of purchase and goods are returned in accordance with Collins instructions.

(c) Equipment, accessories, tubes, and batteries not manufactured by Collins or from Collins designs are subject to only such adjustments as Collins may obtain from the supplier thereof.

(d) No equipment or accessory shall be deemed to be defective if, due to exposure or excessive moisture in the atmosphere or otherwise after delivery, it shall fail to operate in a normal and proper manner.

(e) Any failure due to use of equipment in excess of that contemplated in normal amateur operations shall not be deemed a defect within the meaning of these provisions.

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Collins Radio Company
Customer Return Goods Department
Cedar Rapids, Iowa

INFORMATION NEEDED:

(A) Type number, name, and serial number of equipment
(B) Date of delivery of equipment
(C) Date placed in service
(D) Number of hours of service
(E) Nature of trouble
(F) Cause of trouble if known

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Service Parts Department
Cedar Rapids, Iowa

INFORMATION NEEDED:

(A) Quantity required
(B) Collins part number (9 or 10 digit number) and description
(C) Item or symbol number obtained from parts list or schematic
(D) Collins type number, name, and serial number of principal equipment
(E) Unit subassembly number (where applicable)

INSTRUCTION BOOK

30S-1
R-F LINEAR AMPLIFIER

520 5879 00
4th EDITION, 1 DECEMBER 1959

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1959

CEDAR RAPIDS, IOWA, U.S.A.

PRINTED IN THE UNITED STATES OF AMERICA

1.1 DESCRIPTION.

The 30S-1 R-F Linear Amplifier consists of a one-stage linear amplifier and the necessary power supplies. It is capable of maximum legal input power in the amateur bands between 3.5 and 29.7 mc. It operates in either CW or SSB service with any exciter (such as KWM-1, KWM-2, or 32S-1) capable of 80 watts PEP output. In addition, the amplifier may be operated outside the amateur bands at any frequency between 3.4 and 30 mc by retuning its input circuits.

TABLE 1. EQUIPMENT FURNISHED WITH 30S-1

QUANTITY	DESCRIPTION	FUNCTION	COLLINS PART NUMBER
1	A-c power cable, three number 12 wires, 10 feet long, with lugs on one end.	A-c power	545 3123 00
2	Microphone cables, 10 feet long, with phono plug (part number 361 0062 00) on each end.	Alc and antenna relay cables	426 2029 00
1	RG-58/U cable, 20.5 feet long, with phono plug (part number 361 0062 00) on each end.	R-f input cable	545 3121 00
1	RG-8A/U cable, 10 feet long, with type C connector (part number 357 9261 00) on each end.	R-f output cable	545 3122 00
1	Bag containing fuses.	Spares	544 6885 00
1	Polyethylene spiral wrapping six feet long.	Lacing the interconnecting cables	152 3370 00

2.1 INSTALLATION AND ADJUSTMENTS.

a. Set the 30S-1 on the floor beside the operating desk.

b. Connect to 32S-1, KWM-1, or KWM-2 exciter as shown in figures 1, 2, and 3. A length of polyethylene spiral wrapping is included with the 30S-1 for making a neat bundle of interconnecting wires behind the desk.

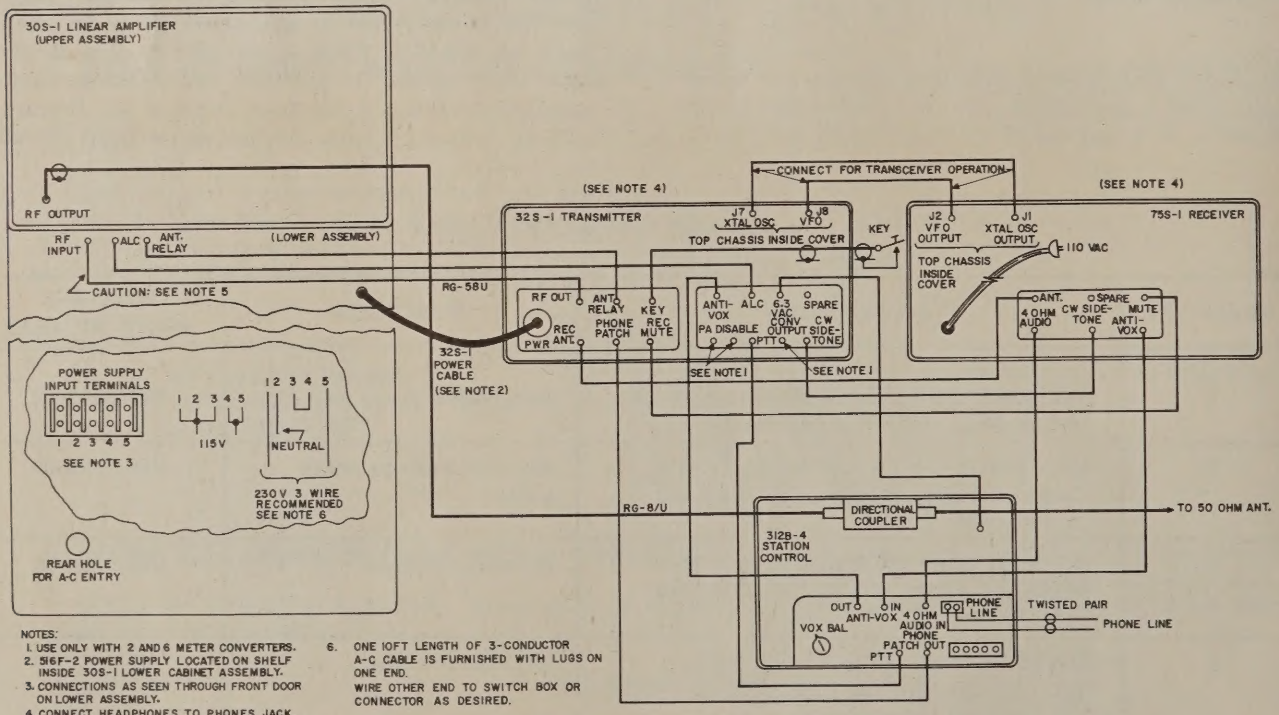
c. If KWM-1 models above serial number 861 are used with the 30S-1, it will be necessary to bring out alc and "ground-on-transmit" connections from J5 (of KWM-1). Make the alc connection to pin 19 on J5, and make the "ground-on-transmit" connection to pin 20 of the same jack. This will allow the switching circuits of the KWM-1 to control the antenna changeover relays of the 30S-1 when connected to J203 on the 30S-1.

d. If KWM-1 models below serial number 861 are used with the 30S-1, it is necessary to make connections inside the KWM-1 for alc. Use an ohmmeter to locate the feedthrough capacitor, C169, which is connected to pin 19 of J5. Connect a wire from this feedthrough capacitor to pin 7 of tube socket XV10. It also is necessary to connect an external dropping resistor and relay, as shown in the detail of figure 3, for KWM-1 control of changeover relays in the 30S-1. Locate the feedthrough capacitor, C206, which is connected to pin 20 of J5 (in KWM-1) in same manner as pin 19 was located above. Connect a wire from terminal 8 of TB1 in KWM-1 to C206. External to the KWM-1, connect a 10,000-ohm, 5-watt resistor and relay coil in series from J5-20 to a ground on the rear of the KWM-1 chassis. Use a relay, such as Collins part number 972 1346 00, with a 10,000-ohm, 10-ma coil and a set of normally open contacts. Connect the normally open contacts through a piece of shielded wire (or microphone cable) and a phono plug to ANT. RELAY (J203) on the 30S-1. This arrangement will allow KWM-1 switching of 30S-1 changeover relays. BE CAREFUL to protect the operator from the 260-volt B+ present on the resistor and relay coil connections.

NOTE

The r-f cable supplied for connecting the 32S-1 or the KWM-2 to the 30S-1 is 20.5 feet long. DO NOT cut this cable. This length is optimum in maintaining the low-distortion figure for which the equipment was designed. An additional 2.5 feet of cable with connectors is supplied for connecting the KWM-1 output to the 30S-1. This makes a total of 23 feet for the KWM-1 connection.

e. Loosen the exciter power supply shelf, shown in figure 4, and tip it back out of the way. This may be done by removing three flathead machine screws along the left side of the shelf (heads of screws inside cabinet) and two sheet-metal screws along the back edge (heads of screws outside cabinet).



NOTES:
1. USE ONLY WITH 2 AND 6 METER CONVERTERS.
2. 516F-2 POWER SUPPLY LOCATED ON SHELF INSIDE 30S-1 LOWER CABINET ASSEMBLY.
3. CONNECTIONS AS SEEN THROUGH FRONT DOOR ON LOWER ASSEMBLY.
4. CONNECT HEADPHONES TO PHONES JACK, FRONT OF 75S-1. CONNECT MICROPHONE TO MICROPHONE JACK, FRONT OF 32S-1.
5. THIS COAXIAL CABLE IS FURNISHED IN 20.5 FT LENGTH, DO NOT SHORTEN OR SUBSTITUTE ANY OTHER LENGTH.
6. ONE 10FT LENGTH OF 3-CONDUCTOR A-C CABLE IS FURNISHED WITH LUGS ON ONE END. WIRE OTHER END TO SWITCH BOX OR CONNECTOR AS DESIRED.

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Figure 1. Station Interconnections with 32S-1 and 75S-1

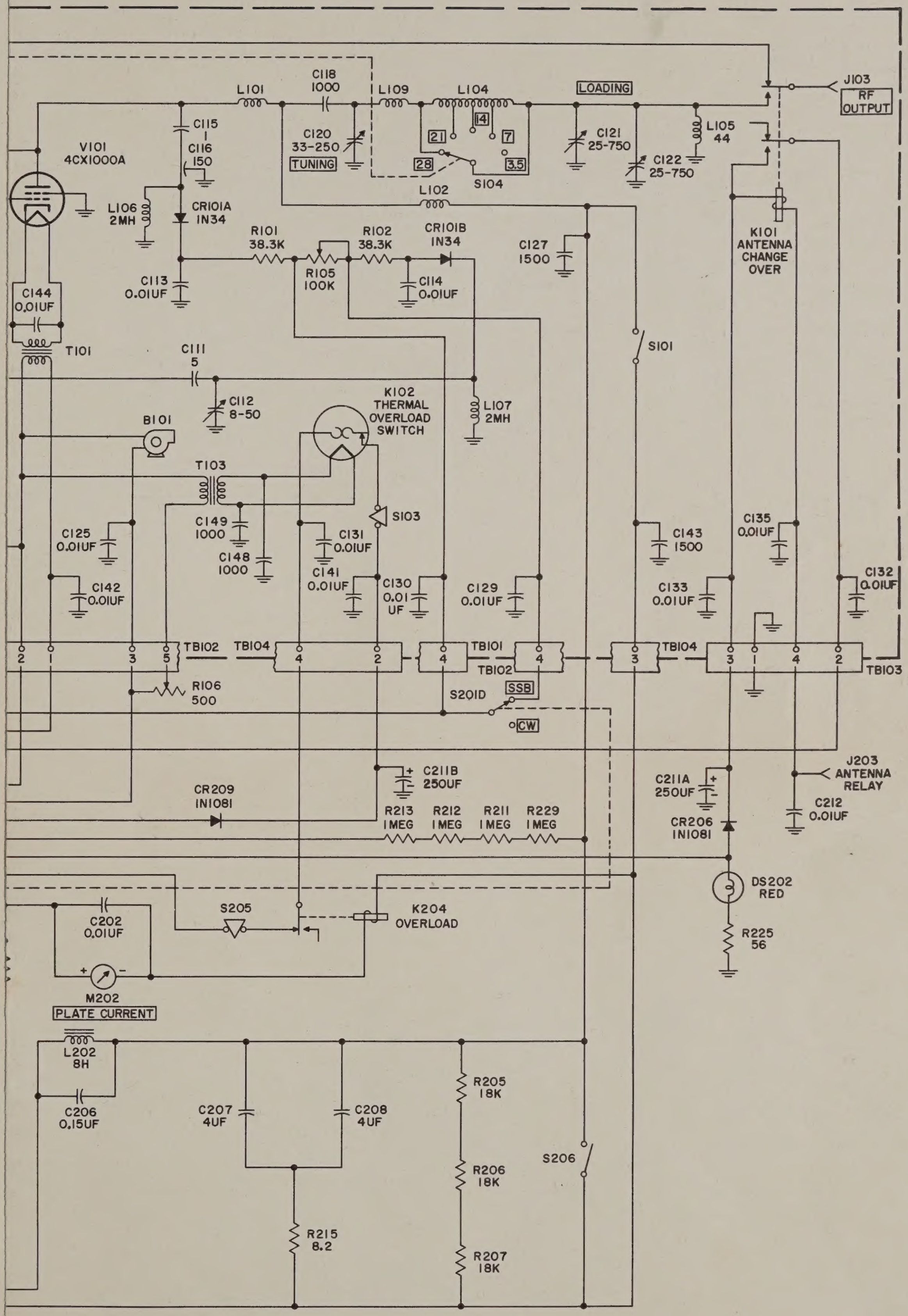

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Figure 12. 30S-1 R-F Linear Amplifier, Over-all Schematic Diagram

2.1 INSTALLATION AND ADJUSTMENTS.

a. Set the 30S-1 on the floor beside the operating desk.

b. Connect to 32S-1, KWM-1, or KWM-2 exciter as shown in figures 1, 2, and 3. A length of polyethylene spiral wrapping is included with the 30S-1 for making a neat bundle of interconnecting wires behind the desk.

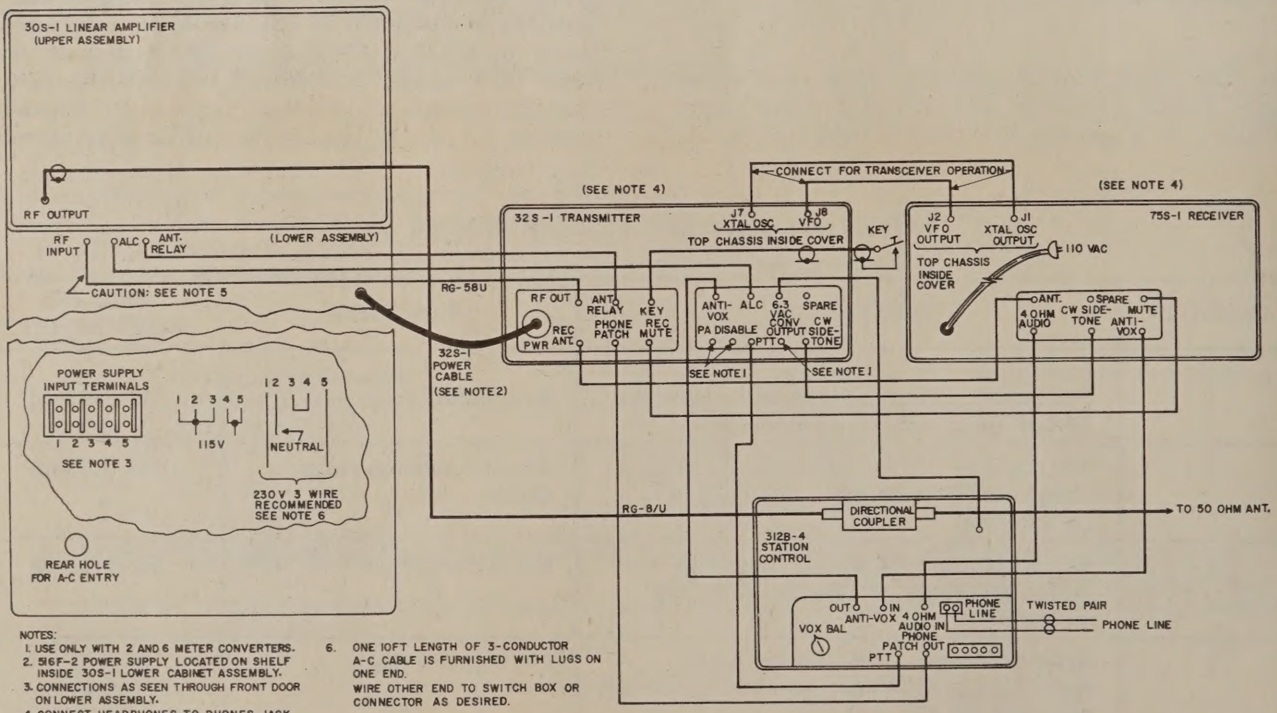
c. If KWM-1 models above serial number 861 are used with the 30S-1, it will be necessary to bring out alc and "ground-on-transmit" connections from J5 (of KWM-1). Make the alc connection to pin 19 on J5, and make the "ground-on-transmit" connection to pin 20 of the same jack. This will allow the switching circuits of the KWM-1 to control the antenna changeover relays of the 30S-1 when connected to J203 on the 30S-1.

d. If KWM-1 models below serial number 861 are used with the 30S-1, it is necessary to make connections inside the KWM-1 for alc. Use an ohmmeter to locate the feedthrough capacitor, C169, which is connected to pin 19 of J5. Connect a wire from this feedthrough capacitor to pin 7 of tube socket XV10. It also is necessary to connect an external dropping resistor and relay, as shown in the detail of figure 3, for KWM-1 control of changeover relays in the 30S-1. Locate the feedthrough capacitor, C206, which is connected to pin 20 of J5 (in KWM-1) in same manner as pin 19 was located above. Connect a wire from terminal 8 of TB1 in KWM-1 to C206. External to the KWM-1, connect a 10,000-ohm, 5-watt resistor and relay coil in series from J5-20 to a ground on the rear of the KWM-1 chassis. Use a relay, such as Collins part number 972 1346 00, with a 10,000-ohm, 10-ma coil and a set of normally open contacts. Connect the normally open contacts through a piece of shielded wire (or microphone cable) and a phono plug to ANT. RELAY (J203) on the 30S-1. This arrangement will allow KWM-1 switching of 30S-1 changeover relays. BE CAREFUL to protect the operator from the 260-volt B+ present on the resistor and relay coil connections.

NOTE

The r-f cable supplied for connecting the 32S-1 or the KWM-2 to the 30S-1 is 20.5 feet long. DO NOT cut this cable. This length is optimum in maintaining the low-distortion figure for which the equipment was designed. An additional 2.5 feet of cable with connectors is supplied for connecting the KWM-1 output to the 30S-1. This makes a total of 23 feet for the KWM-1 connection.

e. Loosen the exciter power supply shelf, shown in figure 4, and tip it back out of the way. This may be done by removing three flathead machine screws along the left side of the shelf (heads of screws inside cabinet) and two sheet-metal screws along the back edge (heads of screws outside cabinet).



NOTES:
1. USE ONLY WITH 2 AND 6 METER CONVERTERS.
2. 516F-2 POWER SUPPLY LOCATED ON SHELF INSIDE 30S-1 LOWER CABINET ASSEMBLY.
3. CONNECTIONS AS SEEN THROUGH FRONT DOOR ON LOWER ASSEMBLY.
4. CONNECT HEADPHONES TO PHONES JACK, FRONT OF 75S-1. CONNECT MICROPHONE TO MICROPHONE JACK, FRONT OF 32S-1.
5. THIS COAXIAL CABLE IS FURNISHED IN 20.5 FT LENGTH, DO NOT SHORTEN OR SUBSTITUTE ANY OTHER LENGTH.
6. ONE 10FT LENGTH OF 3-CONDUCTOR A-C CABLE IS FURNISHED WITH LUGS ON ONE END. WIRE OTHER END TO SWITCH BOX OR CONNECTOR AS DESIRED.

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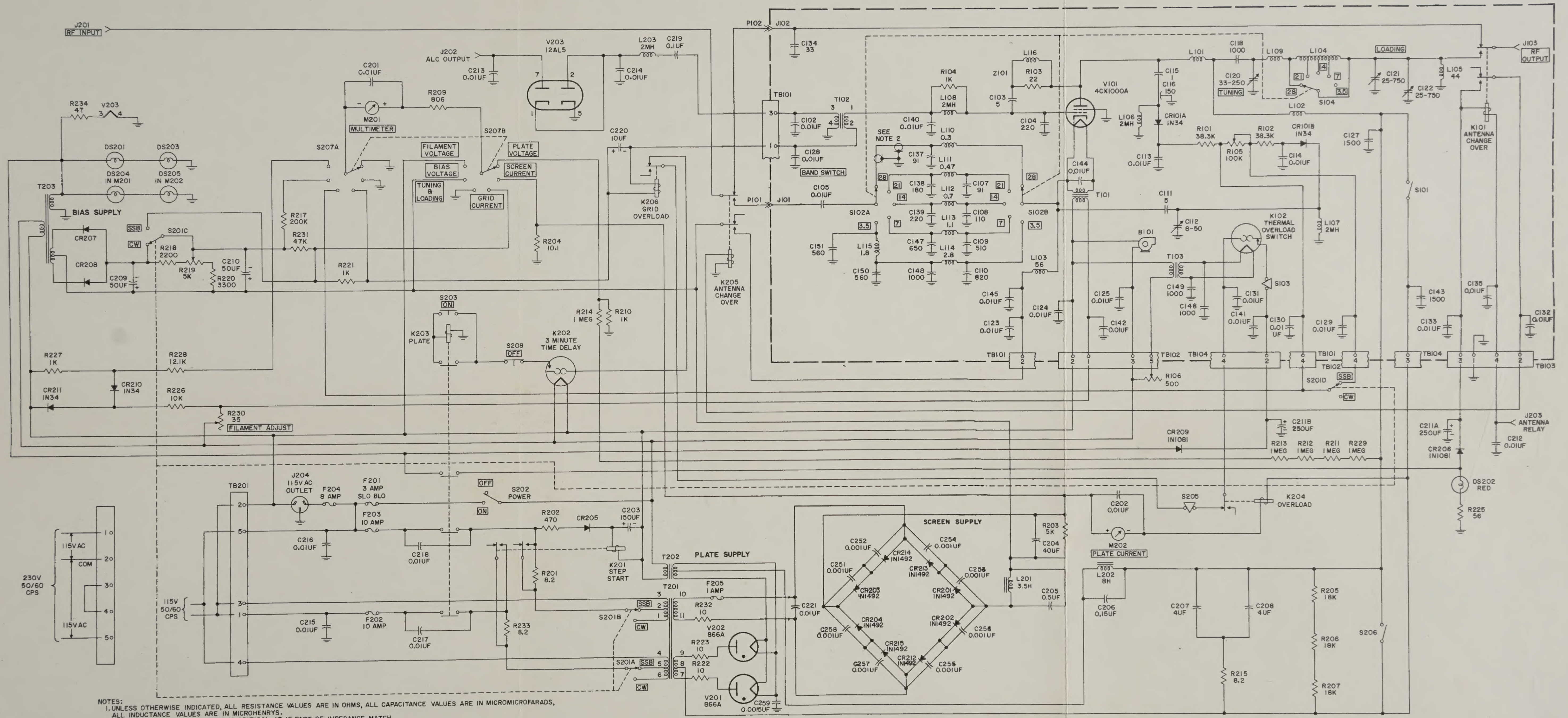
Figure 1. Station Interconnections with 32S-1 and 75S-1



NOTES:
1. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS, ALL INDUCTANCE VALUES ARE IN MICROHENRYS.
2. LENGTH OF THIS COAXIAL LEAD IS CRITICAL. IT IS PART OF IMPEDANCE MATCH.

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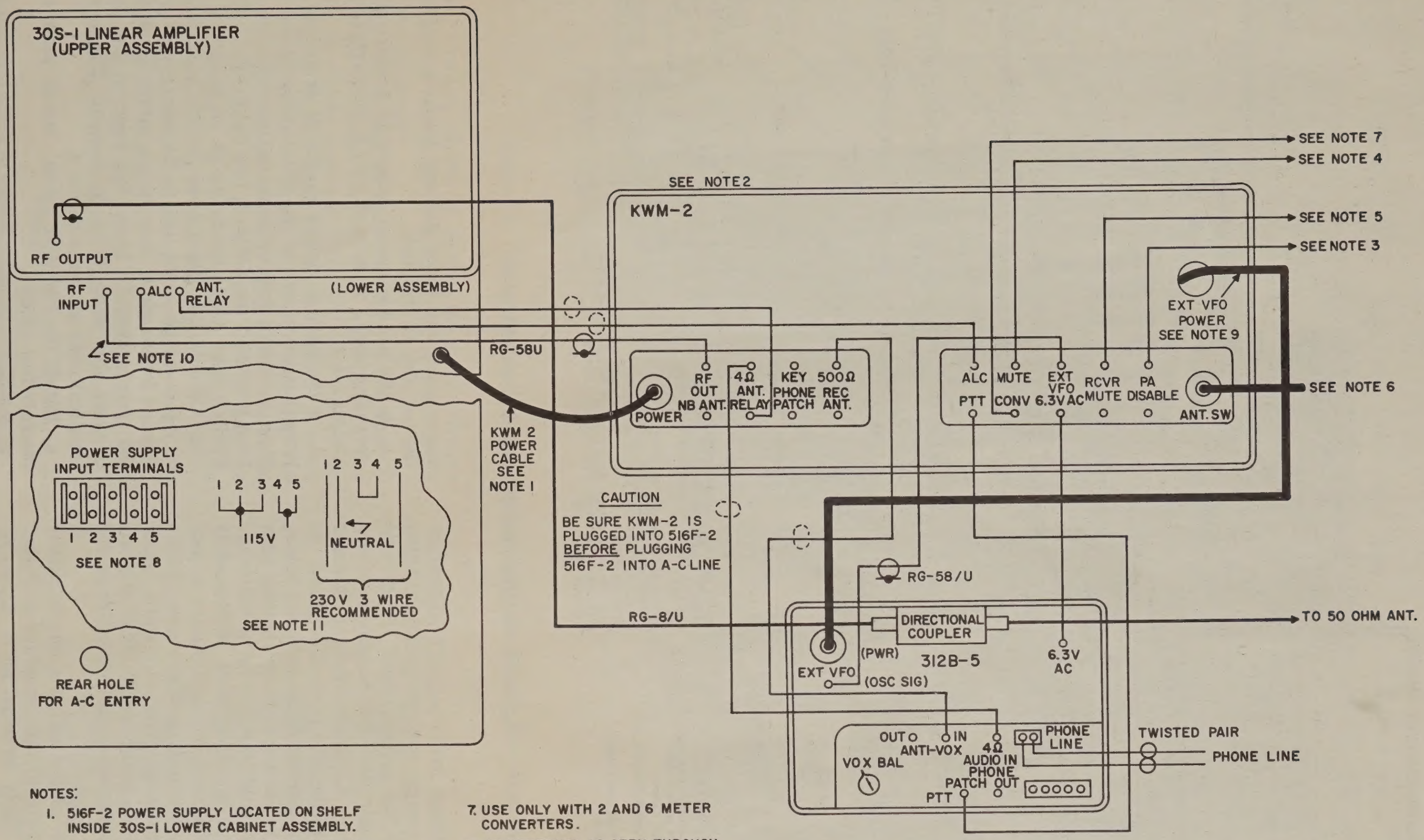
Figure 12. 30S-1 R-F Linear Amplifier, Over-all Schematic Diagram



NOTES:

1. 516F-2 POWER SUPPLY LOCATED ON SHELF INSIDE 30S-I LOWER CABINET ASSEMBLY.
2. CONNECT HEADPHONES TO PHONE JACK ON FRONT OF KWM-2. CONNECT MICROPHONE TO MIC JACK ON FRONT OF KWM-2.
3. USE ONLY WITH 2 AND 6 METER CONVERTERS. (CAUTION +275V DC PRESENT HERE)
4. TO EXTERNAL SWITCH IF CONVERTERS ARE HERE.
5. TO EXTERNAL RECEIVER, IF USED.
6. CABLE TO ANTENNA SWITCHING RELAYS. (IF USED)
7. USE ONLY WITH 2 AND 6 METER CONVERTERS.
8. CONNECTIONS AS SEEN THROUGH FRONT DOOR ON LOWER ASSEMBLY.
9. EXTERNAL VFO POWER CABLE PLUGS INTO J17 ON CHASSIS.
10. THIS CABLE IS FURNISHED WITH 30S-I IN 20.5 FT LENGTH. DO NOT CUT.
11. 10 FT LENGTH OF 3 WIRE (EACH NO. 12) CONDUCTOR WITH LUGS ON ONE END. CONNECT OTHER END TO SWITCHBOX OR PLUG AS DESIRED.

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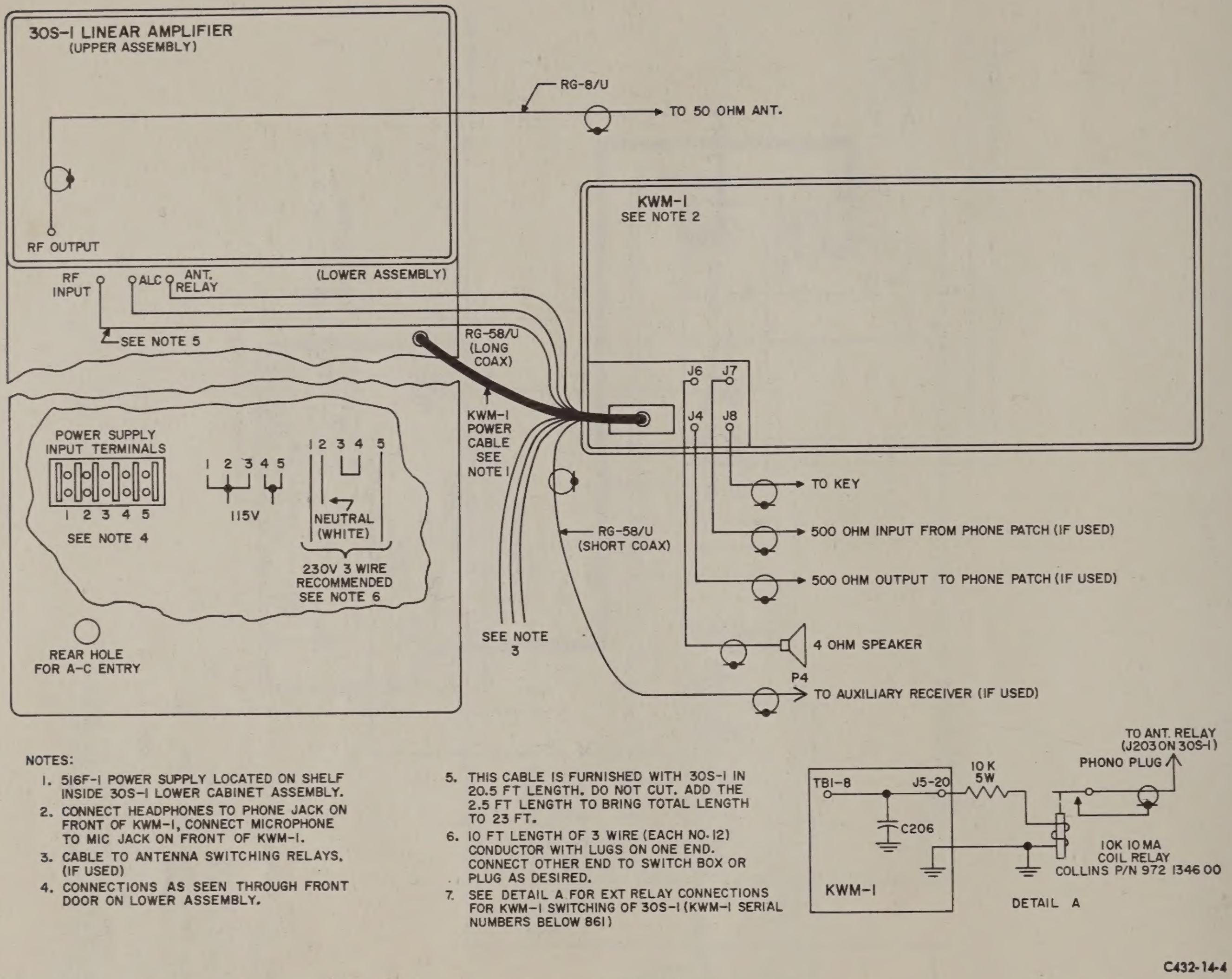
Figure 2. Station Interconnections with KWM-2



NOTES:

1. 516F-1 POWER SUPPLY LOCATED ON SHELF INSIDE 30S-1 LOWER CABINET ASSEMBLY.
2. CONNECT HEADPHONES TO PHONE JACK ON FRONT OF KWM-1, CONNECT MICROPHONE TO MIC JACK ON FRONT OF KWM-1.
3. CABLE TO ANTENNA SWITCHING RELAYS. (IF USED)
4. CONNECTIONS AS SEEN THROUGH FRONT DOOR ON LOWER ASSEMBLY.
5. THIS CABLE IS FURNISHED WITH 30S-1 IN 20.5 FT LENGTH. DO NOT CUT. ADD THE 2.5 FT LENGTH TO BRING TOTAL LENGTH TO 23 FT.
6. 10 FT LENGTH OF 3 WIRE (EACH NO. 12) CONDUCTOR WITH LUGS ON ONE END. CONNECT OTHER END TO SWITCH BOX OR PLUG AS DESIRED.
7. SEE DETAIL A FOR EXT RELAY CONNECTIONS FOR KWM-1 SWITCHING OF 30S-1 (KWM-1 SERIAL NUMBERS BELOW 861)

Figure 3. Station Interconnections with KWM-1

f. Mount the high-voltage power supply transformer (shipped in separate carton) over the mounting holes in the bottom plate of the compartment. Be sure to position the transformer with the terminals at the front as shown in figure 4. Secure the transformer to the cabinet floor with the four screws supplied. In order to insert the rear screws in the mounting holes, it may be necessary to use beeswax or chewing gum on the screwdriver bit to hold the screw for positioning.

g. Connect the center tap leads (both numbered 8) to the ceramic post insulator, shown in figure 4, just in front of the 866A filament transformer, T202.

h. Connect the remaining two secondary leads (numbered 7 and 9) to the lower terminals of the two surge-suppressing resistors mounted behind the rectifier tube sockets.

i. Connect the wires of the cable to the terminal strip across the top edge of the transformer frame according to the wire code information of figure 4.

j. Replace the exciter power supply shelf. Secure to the back edge of the transformer with spacers and screw provided with the shelf. Replace the two sheet-metal screws along the back edge of the shelf, and replace the three flathead machine screws along the left side of the shelf.

k. If the exciter power supply is preferred on the operating desk, disregard note 2 of figure 1 and note 1 of figure 3.

l. If the exciter power supply is preferred in the lower compartment of the 30S-1, remove the 516F-2 from its case before mounting on the shelf in the 30S-1. Plug the 32S-1 (or KWM-2) into the 516F-2. Plug the 516F-2 into J204 (inside 30S-1 on flange of shelf).

m. Connect the 30S-1 power supply input terminals to the a-c line according to the information given in figures 1 through 3. Run the a-c power leads through the entry conduit from the rear of the cabinet. Connect the white wire to neutral. The a-c input terminals are shown in figure 4.

n. Install the rectifier tubes. Install plate caps on the rectifier tubes.

o. Install the PA tube. Make sure the thermal switch, K102, is turned out of the way before inserting the PA tube. BE SURE THE PA TUBE IS INSERTED ALL THE WAY INTO THE SOCKET AND NOT HANGING ON THE EDGE OF THE COOLING CHIMNEY. Turn

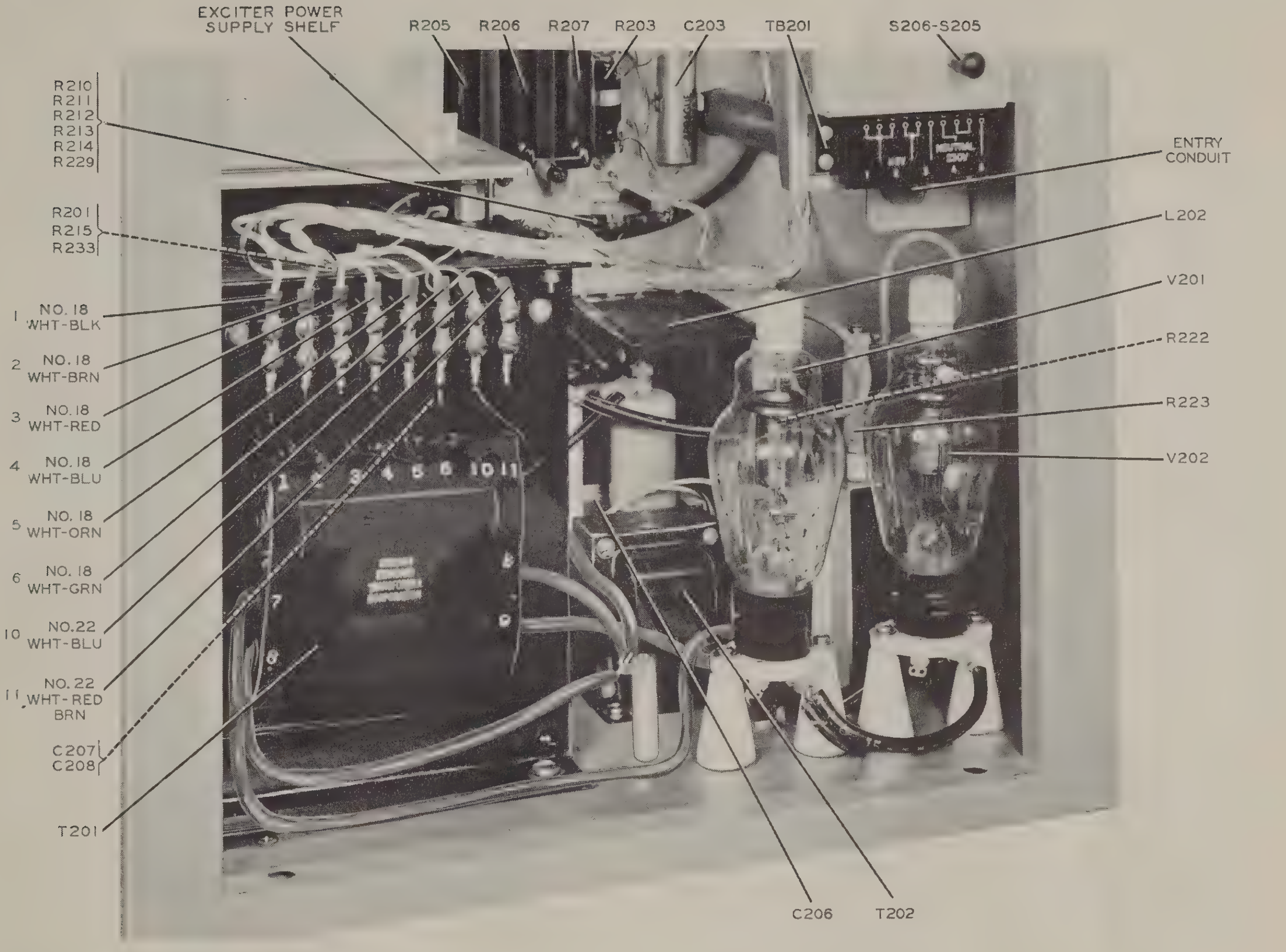


Figure 4. Power Supply Compartment Bottom, Parts Location and Wiring

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the tube 1/3 turn clockwise against the stops. Secure clamp around tube plate radiating pins. Replace K102 in proper position.

p. Refer to figure 6. Turn POWER-OFF switch (1) to POWER position, and let the rectifier filaments age in for thirty minutes. DO NOT apply power to the rectifier plates until this aging period is over.

q. Set the SSB-CW switch (5) to SSB position and the MULTIMETER switch (4) to FILAMENT VOLTAGE position. Be sure the plate power is off and the rectangular red pilot lamp (7) is out. The following adjustments are made without excitation.

r. Set filament voltage to 6.0 volts a-c with FIL ADJUST. Refer to figure 5.

s. Set MULTIMETER switch (4) to PLATE VOLTAGE position, and press the plate ON pushbutton (6).

NOTE

Due to the three-minute delay of time-delay relay K202, plate voltage will not come on until three minutes after filament voltage has been applied. During this three-minute wait, exciter may be operated as a low-power station.

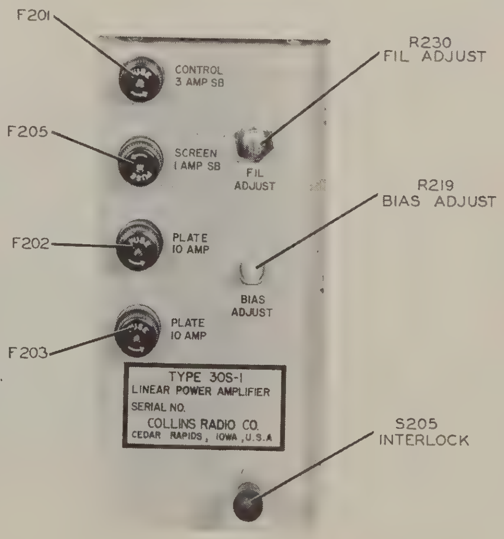

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Figure 5. Filament and Bias Adjustment Locations

WARNING

Do not make bias adjustments with power on. DO NOT BLOCK THE POWER SUPPLY INTERLOCK SWITCH. High voltage present in the power supply is dangerous to life.

t. After the three-minute time delay has elapsed, press plate ON button and the rectangular red pilot lamp should light. Plate voltage should be indicated on the multimeter (9).

u. Set exciter MIC GAIN control full counterclockwise to produce zero drive, and set the exciter EMISSION switch to TUNE position. Idling plate current will be indicated on the 30S-1 PLATE CURRENT meter (8).

v. Remove the front cover from the power supply compartment; make a small change in setting of BIAS ADJUST; replace cover and read PLATE CURRENT meter. Repeat until no-signal plate current is 200 ma.

w. When these adjustments are completed, press the plate OFF pushbutton (2).

3.1 OPERATION IN SSB OR CW SERVICE. (Refer to figure 6.)

a. Set POWER-OFF switch (1) to POWER position.

b. Set exciter bandswitch to desired band and exciter meter switch to ALC. Adjust exciter idling plate current to 50 ma. Be sure 30S-1 and exciter alc jacks are connected together. When the three-minute time delay has elapsed, press plate ON pushbutton. Adjust exciter ALC ZERO for exciter meter indication of zero alc. Press plate OFF pushbutton.

c. Tune and load the exciter into the antenna or dummy load, whichever is connected to RF OUTPUT jack J103 at the rear of the 30S-1. Tune and load the 32S-1 or KWM-2 according to its instruction book, EXCEPT load only to 200 ma plate current. This change in procedure for the 32S-1 or KWM-2 is necessary to realize the low system distortion for which this equipment was designed.

NOTE

Use a 100-watt dummy load (such as Ohmite D-101, 52 ohms) unless antenna and feed line system present swr not exceeding 1.25 to 1.

CAUTION

Do not leave the dummy load connected to the 30S-1 output with the 30S-1 power on unless dummy load used has power dissipating capacity equal to or greater than the output power of the 30S-1.

d. Reduce exciter output to zero by reducing microphone gain to zero.

e. Press 30S-1 plate ON button, and turn 30S-1 BANDSWITCH (3) to desired band.

f. Set MULTIMETER switch (4) to TUNING & LOADING position.

g. Set SSB-CW switch (5) to desired mode of operation.

h. Disconnect dummy load and connect antenna to RF OUTPUT jack.

i. Press plate ON pushbutton (6). The pilot lamp (7) should light if the three-minute time delay has elapsed.

j. With exciter EMISSION switch in LOCK KEY position, increase exciter output by increasing microphone gain until 350-ma plate current is indicated on PLATE CURRENT meter (8).

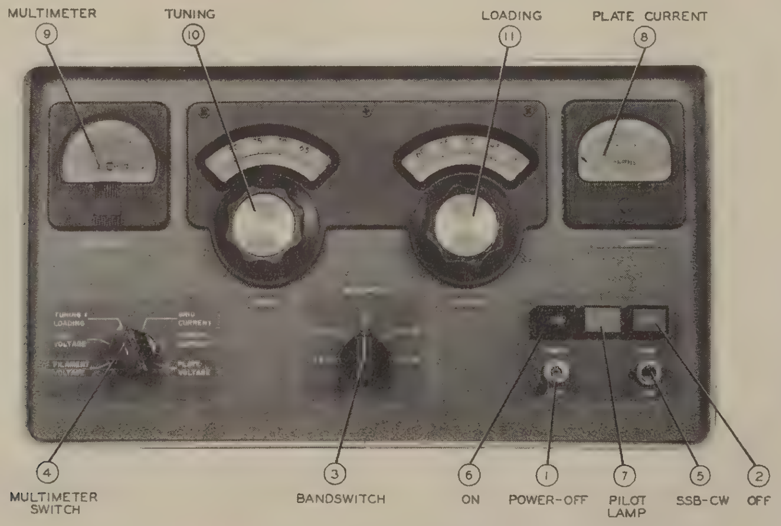

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Figure 6. 30S-1 R-F Linear Amplifier, Operating Controls

k. Observe the MULTIMETER (9). Adjust the TUNING control (10) for MULTIMETER dip, and adjust the LOADING control (11) for MULTIMETER zero until the meter indication is zero at the dip.

l. Adjust exciter output until 30S-1 plate current is 300 ma for SSB or 400 ma for CW.

m. Redip and reload with the TUNING and LOADING controls, keeping multimeter indication at zero.

n. Recheck PLATE CURRENT meter indication for proper value as given in step l. Repeat steps l and m, as necessary, until power amplifier is loaded to 400 ma for CW or 300 ma for SSB. DO NOT switch from SSB to CW (or from CW to SSB) while operating. BE SURE 30S-1 plate voltage is off when changing setting of SSB-CW switch (5).

o. For SSB operation, set 32S-1 (or KWM-2) EMISSION switch to USB or LSB. Set exciter METER switch to ALC. Adjust MIC GAIN for meter indication of 6 db for 32S-1 (or S6 for KWM-1 or KWM-2) for peak voice readings in normal operation of the exciter. For CW operation, set EMISSION switch to CW. Station is now ready to operate.

p. Pressing the plate OFF pushbutton (2) automatically switches the exciter to the antenna for low-power operation.

CAUTION

Wait at least five seconds after pressing plate OFF button (2) before pressing plate ON button (6). This delay is necessary to allow the step-start circuit to recover.

NOTE

The cathode input circuit on the 3.5-mc band is factory tuned for minimum input vswr at 3.8 mc. The vswr will increase for operation on other parts of the band. This will cause small changes in the normal load setting of the exciter. It is possible, but not necessary, to adjust L114 for minimum vswr at a favored part of the 3.5-mc band.

q. Table 2 lists full-scale and normal meter indications for all scales of the multimeter. Full-scale indication on the PLATE CURRENT meter is 1000 ma, and normal indication on this meter is 400 ma for CW or 300 ma for SSB. According to FCC regulations, the drive power to the grounded-grid amplifier must be added to PA plate power input to determine total final amplifier plate power input. The above plate current ratings are set to keep amplifier input legal.

CAUTION

If the 30S-1 is to be driven by an exciter not having automatic load control (alc), keep drive power and modulation level low to produce no grid current. Monitor PA grid current continuously while transmitting, and keep drive level at point which just produces a slight kick in grid current indication.

TABLE 2. MULTIMETER SCALE VALUES

MULTIMETER SWITCH SETTINGS	FULL-SCALE INDICATIONS	NORMAL INDICATIONS
FILAMENT VOLTAGE	10 volts a-c	6.0 volts a-c
BIAS VOLTAGE	-100 volts d-c	Voltage necessary to set idling plate current to 200 ma.
TUNING & LOADING	Not applicable	0 when 30S-1 is properly loaded.
GRID CURRENT	1.0 ma	Never more than 0.2 ma in CW, 0 in SSB
SCREEN CURRENT	50 ma	Disregard. Use only for maintenance purposes.
PLATE VOLTAGE	5000 volts	2000 for CW 3000 for SSB

4.1 CIRCUIT DESCRIPTION.

Refer to figures 7 and 12. The power amplifier stage is a single, ceramic tetrode which is cathode driven. The grid is grounded for r-f by capacitor C104. The screen grid is connected directly to ground.

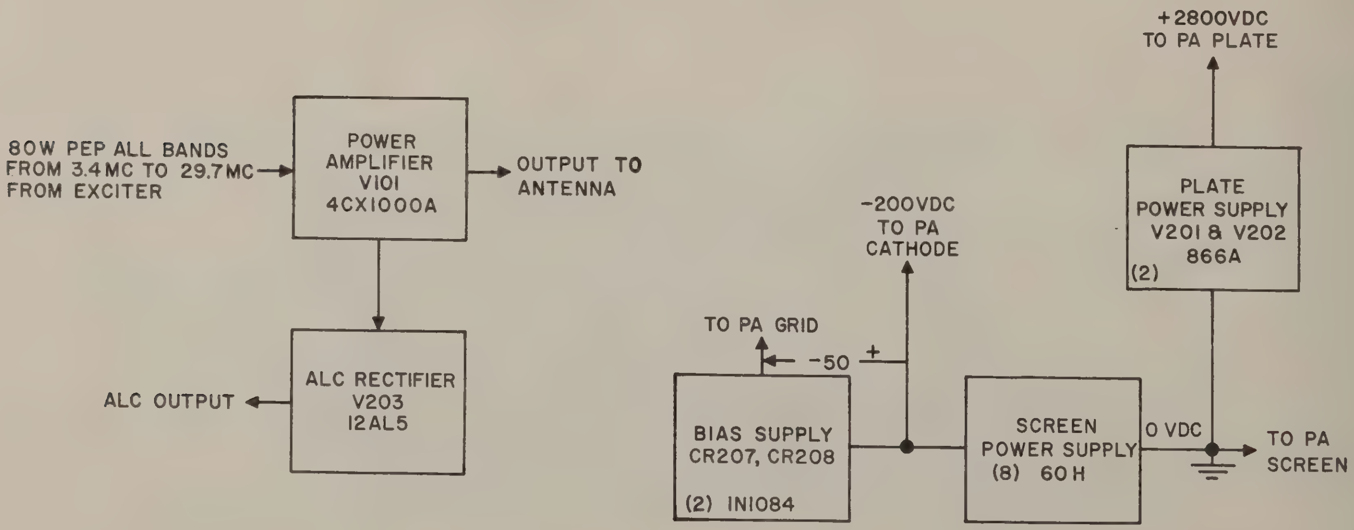
Pi network broad-tuned circuits match the 50-ohm input to the cathode impedance which is approximately 100 ohms. The 20.5-foot length of cable is necessary between 32S-1 driver and 30S-1 input circuits because there must be an even multiple of 180-degree phase shifts between driver plate and power amplifier grid. The cable length and the 30S-1 input circuits together accomplish this. The necessity of an even multiple of 180-degree phase shifts is due to the fact that modulation components cause a change in the resistive PA cathode impedance which is translated to a shift in reactive impedance at the driver plate. The shift in reactive impedance at the driver plate results in phase modulation of the driver and increases the total over-all distortion of the system. A 2.5-foot additional length of cable is furnished to bring the total interconnecting cable length to 23.0 feet for use with the KWM-1 as driver. Drive power required for maximum legal input on SSB is 80 watts PEP. The plate is tuned by a pi network consisting of C120, L109, L104, C121, and C122. When the plate power is disconnected by depressing the OFF pushbutton, the exciter output is connected through normally closed contacts of relays K205 and K101 to the antenna. When the ON pushbutton is depressed, the exciter power is connected to the power amplifier cathode, and the antenna connection is transferred to the output of the power amplifier plate circuit. Automatic load control (alc) signal from the grid circuit of the power amplifier is coupled through transformer T102 to the alc rectifier, V204. The rectified and filtered alc voltage is applied to J202 for use in the exciter to prevent overdriving the power amplifier.

Additional protective devices include time-delay relay K202, step-start relay K201, grid overload relay K206, and plate overload relay K204 in the power supply, and thermal overload relay K102 in the power amplifier compartment. The thermal overload relay, K102, protects the power amplifier tube from overdissipation and loss of cooling air. Its bimetallic strip has contacts connected in series with the interlock system and is mounted in the air stream from V101. Current from transformer T103 is passed through the bimetallic strip. If the air stream fails, the temperature of the bimetallic strip increases, opening the interlock circuit and removing voltages from the power amplifier. If overdissipation occurs in the plate circuit, the higher air temperature causes K102 to operate.

CAUTION

> Adjustment for proper operating points of K102 are made at the factory. DO NOT ALTER this adjustment or loss of thermal protection for V101 may result.

Refer to figures 7 and 12. Since the power amplifier screen grid is at d-c ground potential, it is necessary to provide the cathode with negative 200 volts in order to supply screen voltage which is 200 volts higher than the cathode potential. Effective plate-cathode



C432-01-3

Figure 7. 30S-1 R-F Linear Amplifier, Block Diagram voltage is the sum of the screen-plate supply (2800 volts) and the cathode-screen supply (200 volts). Control grid bias is referenced to the cathode. All plate and screen current passes through the 200-volt supply, and only plate current through the 2800-volt supply. All relays are operated from d-c sources except time-delay relay K202 and thermal overload relay K102. Switching from SSB to CW operation automatically lowers plate voltage and changes grid bias. The amplifier operates with approximately 3000 volts plate-to-cathode in SSB service and approximately 2000 volts plate-to-cathode in CW service. The power supplies may be connected to either 115-volt lines or to 230-volt, 3-wire service lines. The 230-volt, 3-wire connection is preferred.

5.1 MAINTENANCE.

5.1.1 GENERAL. No special test equipment is required for adjustment of the input r-f circuits if the station includes an r-f wattmeter and directional coupler such as are included in the 312B-4 Station Control. If it is necessary to adjust the loading indication of the multimeter, required test equipment includes a 2500-watt, noninductive dummy load and a two-tone audio oscillator (750 and 1900 cps). If it is necessary to remove the PA tube, slide thermal interlock switch aside, loosen clamp, turn tube 1/3 turn counterclockwise, and pull out. To replace PA tube, insert in socket and turn 1/3 turn clockwise against stops. Tighten clamp. Return thermal interlock switch to original position.

CAUTION

If any replacements are made in input circuits, be sure to retain the 6.1-foot coaxial lead between S102A and L110. This length of cable is part of the matching network and is critical.

5.1.2 BLOWER LUBRICATION. Every 1000 hours of operation (approximately 6 months of normal use), lubricate the blower motor bearings with a few drops of lightweight oil. Sewing-machine oil is adequate. Do not overlubricate.

5.1.3 ALIGNMENT OF R-F INPUT CIRCUITS.

a. Set exciter to TUNE and 30S-1 SSB-CW switch to SSB. Apply 20 watts of single tone drive from the station exciter. Exciter frequency should be 3.6 mc if CW operation only is favored, 3.8 mc if both CW and phone are desired, or 3.9 mc if phone operation only is favored.

b. Load 30S-1 into a 2500-watt, 50-ohm dummy load. Adjust 3.5-mc coil for minimum input vswr (1.5 to 1 or lower). This adjustment is accessible through the first hole in the cover (when facing front panel and counting from left to right). Refer to figure 7. Make all adjustments through holes in the cover. Calculate vswr from wattmeter readings in 32S-1 output.

c. Repeat at 7.2 mc, 14.3 mc, 21.3 mc, and 28.6 mc, adjusting L113, L112, L111, and L110, respectively.

5.1.4 BIAS AND FILAMENT VOLTAGE ADJUSTMENT. Occasionally check the FILAMENT VOLTAGE reading on the MULTIMETER and the no-signal plate current on the PLATE CURRENT meter. If these readings are not 6.0 volts a-c and 200 ma d-c, respectively, adjust as in paragraph 2.1.

5.1.5 LOADING INDICATOR ADJUSTMENT. The loading indicator circuit may be checked for accuracy as follows:

a. Connect a 50-ohm, 2500-watt, noninductive dummy load to the output of the 30S-1 at J103.

NOTE

Do not use lamp bulbs. Their resistance changes with temperature.

b. Set up the 30S-1 and the exciter for SSB operation on 14.3 mc and introduce a two-tone (750 and 1900 cps) signal to the microphone input of the exciter. Adjust the audio oscillators for equal amplitude of the two tones.

c. Advance the exciter MIC GAIN control until the exciter metering circuit indicates about 6 db of automatic load control (alc).

d. Set MULTIMETER switch to SCREEN CURRENT position. Adjust TUNING control to produce peak screen current indication. Using the left hand on the TUNING control and the right hand on the LOADING control, adjust TUNING and LOADING controls for screen current peak until screen current peaks at 0. During this procedure, increase exciter MIC GAIN, as necessary, to maintain alc reading of 6 db.

e. Set the MULTIMETER switch to TUNING & LOADING position. Adjust TUNING control to dip the meter indication. If the circuits are in adjustment, the multimeter will indicate 0.

f. If the meter indication in step e is not satisfactory, adjust C112 until the meter indication is zero. See figure 8 for location of capacitor C112.

g. Switch the exciter and 30S-1 to CW. Remove the two-tone input. Set the MULTIMETER switch to GRID CURRENT position. Increase MIC GAIN setting on the exciter to produce 0.2 ma power amplifier grid current.

CAUTION

DO NOT allow PA grid current to exceed 0.5 ma or power amplifier tube V101 will be damaged.

h. Set MULTIMETER switch to TUNING & LOADING position. Adjust the TUNING control to produce a dip in the multimeter indication. Adjust LOADING control for peak PLATE CURRENT meter indication. Continue adjusting TUNING control for multimeter dip and LOADING control for PLATE CURRENT meter peak until the PLATE CURRENT meter indicates 480 ma and the MULTIMETER indicates 0. If the circuits are in adjustment, the MULTIMETER will read 0 when the plate current is 480 ma.

i. If the multimeter indication in step h is not satisfactory, adjust R105 until multimeter indication is zero. See figure 10 for location of R105.

5.1.6 DIAL CORD REPLACEMENT. Refer to figure 9. Remove all control knobs. Remove the flathead screws securing the front panel to the cabinet. These screws are arranged across the top front and bottom front edges of the cabinet. The power supply front cover must be removed to gain access to the bottom screws. Do not loosen the screws at the sides of the cabinet. Remove the front panel from the cabinet, exposing subpanel and dial drive assemblies. Remove the broken or defective dial cord and replace with proper length of the new cord from Collins part number 432 1009 00. When ordering dial cord, be sure to state desired length in feet. If possible, measure the required length of the new cord to be cut by the length of the old cord removed. Note that switch drive cords are not under spring tension. These cords are pulled and tied tight in order to bring switches into positive detent. Replace front panel and knobs. If switches are not aligned to same relative positions after the dial cord replacement, loosen the shaft couplers and align switches and knobs for proper positions. Retighten couplers.

6.1 SPECIFICATIONS.

Size	30-5/8 in. high, 17 in. wide, 18-3/4 in. deep (over-all dimensions)
Weight	160 pounds
Frequency range	3.5 mc - 29.7 mc, covering all amateur bands. By retuning input coils as necessary, the following general coverage bands may be covered:

Frequency Band	Total Coverage
3.5 mc	3.4 - 6.5 mc
7.0 mc	6.5 - 9.5 mc
14.0 mc	9.5 - 15.0 mc
21.0 mc	15.0 - 22.0 mc
28.0 mc	22.0 - 30.0 mc

Mode	SSB or CW
Type of service	Intermittent commercial or amateur
Plate power input	CW - 1000 watts input SSB - Nominal average input of 1000 watts with speech. Distortion products at this level are at least 35 db down from signal.
Drive power requirements	SSB - 80 watts PEP. CW - 60 watts.
Primary power requirements	230 volts a-c, 3-wire, single-phase, at 15 amperes or 115 volts a-c at 30 amperes.
Input impedance	52 ohms
Output impedance	52 ohms unbalanced with swr not to exceed 2 to 1.
Noise level	40 db down from output signal with 1-kw single-tone input.
Harmonic output	All harmonics at least 50 db down from output signal.
Vacuum tubes	PA - 4CX1000A (1) Rectifiers - 866A (2) Alc rectifier - 12AL5 (1)

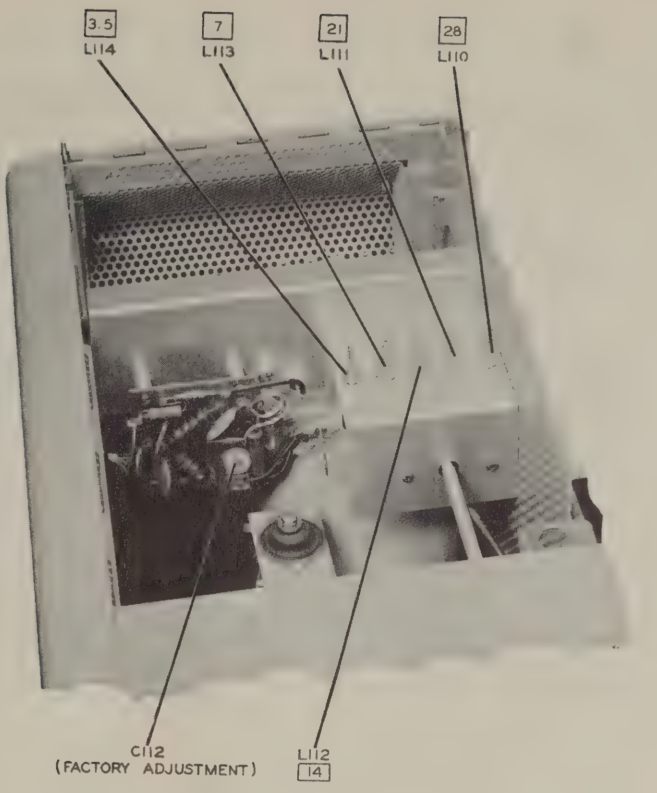


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Figure 8. Input Tuned Circuit Adjustments Locations

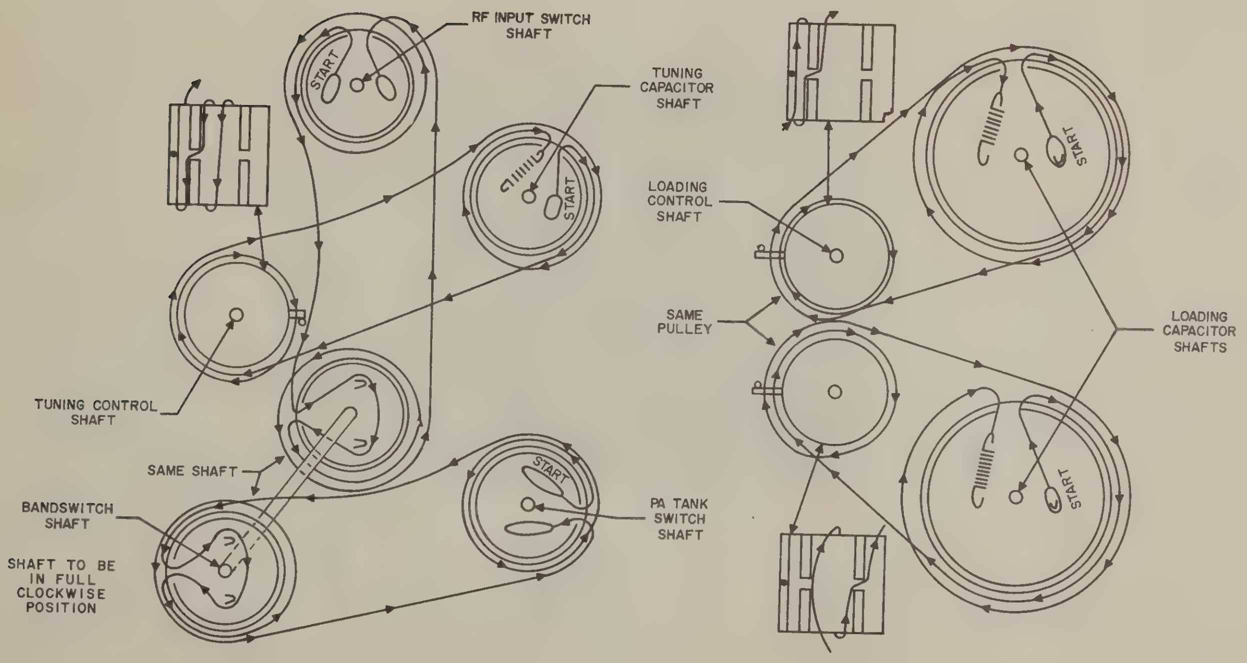

Figure 9. Dial Cord Replacement Diagram

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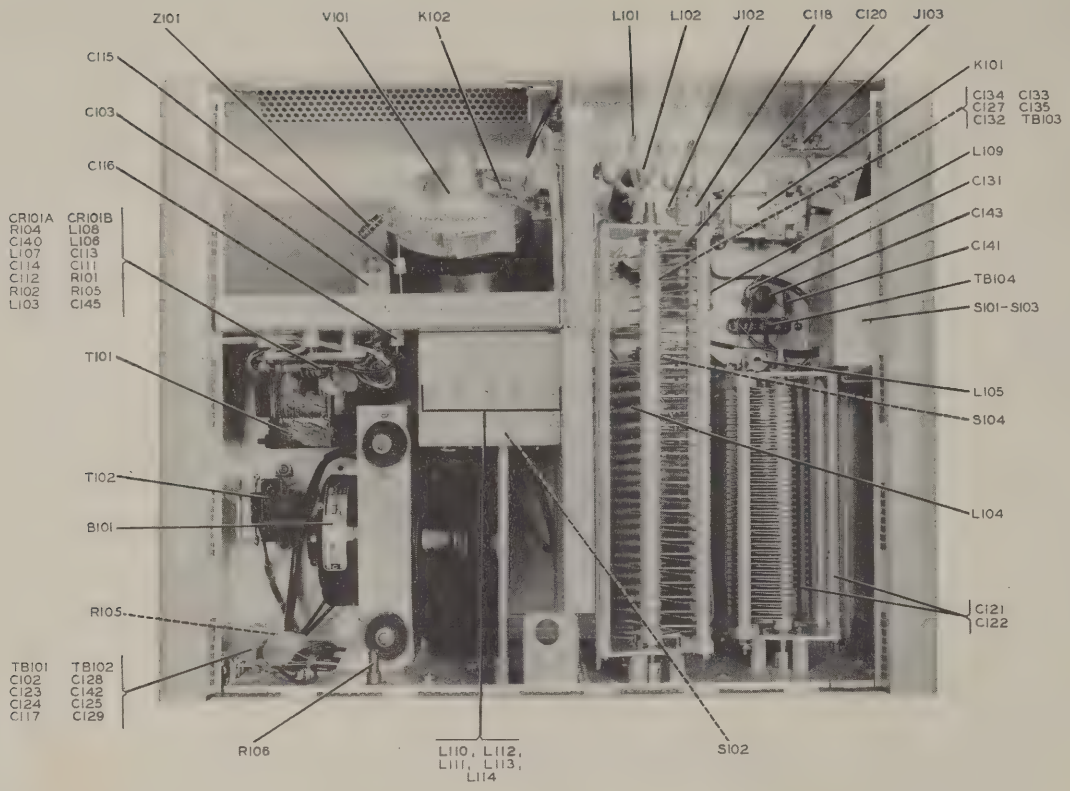

Figure 10. Power Amplifier Compartment, Parts Location

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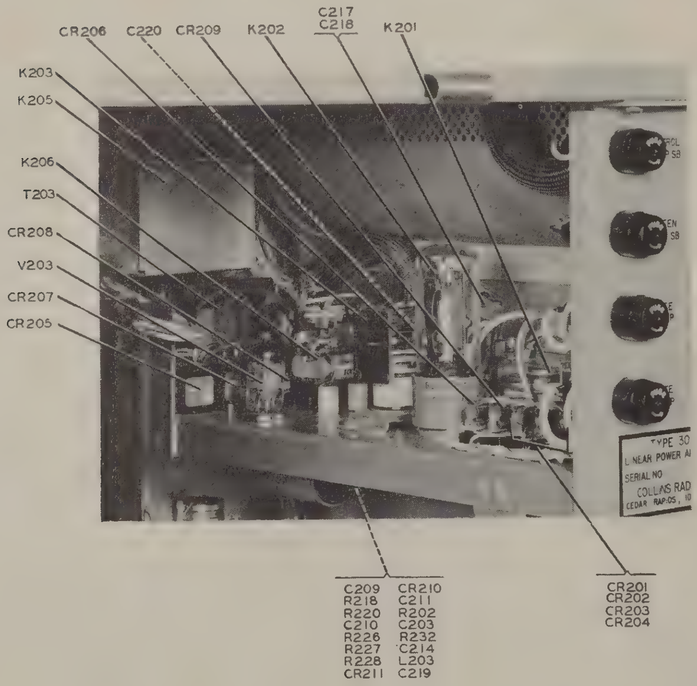

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Figure 11. Shelf in Power Supply Compartment, Parts Location

7.1 PARTS LIST.

Figures 3, 8, 10, and 11 show parts identification of the 30S-1. Following is a parts list for the 30S-1.

ITEM	DESCRIPTION	COLLINS PART NUMBER
	30S-1 R-F LINEAR AMPLIFIER	522 1286 00
	Upper Cabinet	544 6873 00
B101	BLOWER: direct connected; 115 v ac, 60 cps, single phase, 0.30 amp, 1550 rpm	009 1407 00
C101	NOT USED	
C102, C105, C113, C114, C117, C123, C125, C128, thru C133, C135, C140, C141, C142, C144, C145	CAPACITOR, CERAMIC: 10,000 uuf, +100% -20%, 500 v dc	913 3013 00
C103	CAPACITOR, CERAMIC: 5 uuf, ±5%, 5000 v dc	913 0840 00
C104	CAPACITOR, CERAMIC: 220 uuf, ±5%, 1000 v dc	913 3538 00
C106	NOT USED	
C107, C137	CAPACITOR, CERAMIC: 91 uuf, ±5%, 1000 v dc	913 3579 00
C108	CAPACITOR, CERAMIC: 82 uuf, ±5%, 1000 v dc	913 3578 00
C109	CAPACITOR, CERAMIC: 360 uuf, ±5%, 1000 v dc	913 3584 00
C110	CAPACITOR, CERAMIC: 820 uuf, ±5%, 1000 v dc	913 3586 00
C111	CAPACITOR, MICA: 5 uuf, ±10%, 500 v dc	912 2751 00
C112	CAPACITOR, VARIABLE, CERAMIC: 8 to 75 uuf, 350 v dc	917 1075 00
C115	CAPACITOR, CERAMIC: 1 uuf, ±25%, 5000 v dc	913 3703 00
C116	CAPACITOR, CERAMIC: 150 uuf, ±10%, 500 v dc	913 3705 00
C118	CAPACITOR, CERAMIC: 1000 uuf, ±20%, 5000 v dc	913 0101 00
C119	NOT USED	
C120	CAPACITOR, VARIABLE, AIR: 32 uuf min. to 241 uuf max	920 0137 00
C121	CAPACITOR, VARIABLE, AIR: 29 uuf min. to 700 uuf max	920 0150 00
C124	NOT USED	
C126	NOT USED	
C127, C143	CAPACITOR, CERAMIC: 0.0015 uf, ±20%, 6000 v dc	913 3539 00
C134	CAPACITOR, MICA: 33 uuf, ±10%, 500 v dc	912 2781 00
C136	NOT USED	
C138	CAPACITOR, CERAMIC: 180 uuf, ±5%, 1000 v dc	913 3581 00
C139	CAPACITOR, CERAMIC: 220 uuf, ±5%, 1000 v dc	913 3582 00
C146, C148, C149	CAPACITOR, CERAMIC: 1000 uuf, ±5%, 1000 v dc	913 3587 00
C147	CAPACITOR, CERAMIC: 510 uuf, ±5%, 1000 v dc	913 3585 00
CR101 A & B	DIODES: matched; type 1N34A	544 6886 00
E101, E102	SWITCH SECTION, ROTARY: 1 moving contact, 7 fixed contacts, 1 pole, phenolic insulation	269 2036 00
J101, J102	JACK, TIP: accommodates 1/8 in. plug; ceramic insulation; brass contacts	360 0088 00
J103	CONNECTOR, RECEPTACLE: 1 female contact; panel mtg; straight shape	357 9003 00
K101	RELAY, ARMATURE: 2C; 10 amps, 115 v ac or 26.5 v dc; 55 ohms coil	970 1922 00
K102	SWITCH-THERMAL OVERLOAD, AIR LOSS PROTECTOR: (repair by replacement only)	545 3120 004
L101	COIL, RADIO FREQUENCY: silver plated copper wire 1/8 in. dia; 3 turns, 15/16 in. ID; 2 in. lg approx	544 6950 002
L102	COIL, RADIO FREQUENCY: 159 turns, single layer wound no. 27 AWG wire	540 7979 00
L103	COIL, RADIO FREQUENCY: single layer wound solenoid. 56 uh inductance, 870 ma cur; 1.30 ohms	240 0191 00
L104	COIL, RADIO FREQUENCY: silver plated copper tubing 3/16 in. dia; 23 turns, 2-1/2 in. id	544 6915 002
L105	COIL, RADIO FREQUENCY: single layer wound; 44 uh, 600 ma; 7 mc to 35 mc	240 0137 00
L106, L107, L108	COIL, RADIO FREQUENCY: universal wound; 2 mh inductance, 100 ma cur; 50,000 ohms	240 0134 00
L109	COIL, RADIO FREQUENCY: silver plated copper tubing 3/16 in. dia; 3 turns, approx 2-1/8 in. lg	544 6900 002
L110	COIL, RADIO FREQUENCY: 5 turns, single layer wound, no. 20, 0.28-0.45 uh	544 6999 003
L111	COIL, RADIO FREQUENCY: 6 turns, single layer wound, no. 20, 0.35 to 0.6 uh	544 6998 003
L112	COIL, RADIO FREQUENCY: 7 turns, single layer wound, no. 0.7 to 1.1 uh	544 7002 003
L113	COIL, RADIO FREQUENCY: 11 turns, single layer wound, no. 20, .9 to 1.5 uh	544 7001 003
L114	COIL, RADIO FREQUENCY: 19 turns, no. 22, 1.9 to 3.1	544 7000 003
L115	COIL, RADIO FREQUENCY: 11 turns, no. 20, 1.8 uh	545 7814 00
L116	P/O Z101	
MP101, MP108	PULLEY: steel, 1 "U" shaped groove, 1.625 in. od; brass hub 1/4 in. id	544 6949 002
MP102	DRUM, LOADING, PRESSED: aluminum; 0.250 in. id by 1-5/8 in. od by 1 in. lg; incls 1 pin spring 1/2 in. lg	544 6962 002
MP103	DRUM TUNING, PRESSED: aluminum, 0.250 in. id, 1-3/8 in. od, 7/8 in. lg incl 1 pin spring 1/2 in. lg	544 6964 002
MP104	PULLEY: steel, 1 "U" shape groove; 1.625 in. od; 1 brass hub, 0.188 in. id	544 6899 002
MP105	PULLEY: steel, 1 "U" shape groove; 0.375 in. id, by 2.125 in. od by 1/4 in. thk	281 0054 00
MP106, MP107	PULLEY: steel, 1 "U" shape groove; 0.375 in. id, by 3 in. od by 11/32 in. thk	281 0019 00
O101, O102	KNOB: pointer shape, black phenolic, white markings, 1-5/8 in. w, 29/32 in. lg, overall	544 0777 004
O103, O104	KNOB: round fluted shape, black phenolic, 2.078 in. dia, 0.858 in. w w/skirt	544 0784 003
P101, P102	PLUG, TIP: phono type; 1 terminal; 1-1/4 in. lg Cinch Mfg Corp mfg part no. 14H8171	361 0062 00
R101, R102	RESISTOR, FILM: 38,300 ohms, ±1%, 1/4 w	705 7172 00
R103	RESISTOR, COMPOSITION: 22 ohms, ±10%, 1 w	745 3282 00
R104	RESISTOR, COMPOSITION: 1000 ohms, ±10%, 1 w	745 3352 00
R105	RESISTOR, VARIABLE: ww 100k	376 3275 00
R106	Resistor, VARIABLE: wire wound; 500 ohms, ±10%, 2 w, linear, 7/8 in. slotted shaft	750 0510 00
S101	INTERLOCK ASSEMBLY UPPER: c/o the following	544 6879 00
	SPRING HELICAL COMPRESSION: CRES wire, 1-5/8 in. free length	
	SHAFT: CRES, 1/4 in. dia by 4-1/16 in. lg	544 6924 002
	DISC, SHORTING: brass, 1/16 in. thk, 0.406 in. id, 3/4 in. radius	544 6925 002
	INSULATOR, SWITCH: phenolic, 0.255 in. id, 3/4 in. radius, 3/16 in. thk	544 6926 002
	CLAMP ASSEMBLY TUBE:	544 6967 002
	COLLAR: aluminum setscrew type, 0.250 in. id, 1/2 in. od	
	BRACKET: aluminum, 0.064 in. thk, 1-1/4 in. by 2-3/16 in. by 4 in.	544 6989 003

ITEM	DESCRIPTION	COLLINS PART NUMBER
	BRACKET: aluminum, 0.064 in. thk, 1-1/4 in. by 2-3/16 in. by 4 in. three clinch nuts 4-40 pressed into bracket	544 6990 003
S102	SWITCH SECTION, ROTARY: 1 moving contact, 7 fixed contacts, 1 pole, phenolic insulation	269 2036 00
S103	SWITCH, PUSH: spst, normally open; 0.25 amp, 250 v ac	260 2548 00
S104	SWITCH, ROTARY: 4 fixed, 1 moving contact	544 6988 003
T101	TRANSFORMER, POWER, STEP-DOWN: primary winding 105 v, secondary winding, 6.0 v; 50/60 cps	662 0354 00
T102	TRANSFORMER, AUDIO FREQUENCY: pri, 10,000 ohms, 0 amp; sec. 10,000 ohms, 0 amp	667 0344 00
T103	TRANSFORMER POWER STEP-DOWN: primary winding, 105 v; secondary winding, 0.5 v; 50/60 cps; 7 amps	662 0427 00
V101	ELECTRON TUBE: tetrode type 4CX1000A	256 0123 00
XV101	SOCKET, ELECTRON TUBE: used with tube type 4CX1000A	220 1341 00
Z101	SUPPRESSOR, PARASITIC: 2 turns of no. 20 AWG wire inductance, 22 ohms resistance, 1 watt, incl L116	544 6876 00
	DIAL CABLE: 7 strands stainless steel 0.012 in. dia. nylon coated (specify feet on order)	432 1009 00
	Lower Cabinet	544 6874 00
C201, C202, C212, C213, C214, C215, C216, C217, C218	CAPACITOR, CERAMIC: 10,000 uuf, +100% -20%, 500 v dc	913 3013 00
C203	CAPACITOR, ELECTROLYTIC: 150 uf, +40% -10%, 150 v dc	183 1560 00
C204	CAPACITOR, ELECTROLYTIC: 40 uf, +40% -10%, 350 v dc	183 1559 00
C205	CAPACITOR: 1500 v dc, 0.5 uf, ±10%, mtg bracket	541 5657 004
C206	CAPACITOR, PAPER: 0.15 uf, ±10%, 5000 v dc	930 0035 00
C207, C208	CAPACITOR, PAPER: 4 uf, ±20%, 3000 v dc	930 4314 00
C209, C210	CAPACITOR, ELECTROLYTIC: 50 uf, +100% -10%, 150 v dc	183 1045 00
C211	CAPACITOR, ELECTROLYTIC: dual section, 250 uf ea.; +40% -10%, 25 v dc ea. section	183 1480 00
C219	CAPACITOR, PAPER: 0.1 uf, ±10%, 400 v dc	931 0299 00
C220	CAPACITOR, ELECTROLYTIC: 10 uf, +100% -10%, 25 v dc	183 1033 00
C221	CAPACITOR, CERAMIC: 0.01 uf guaranteed, minimum value	913 3522 00
C251, C252, C253, C254, C255, C256, C257, C258	CAPACITOR, DISC CERAMIC: 0.001 uf, ±20%, 1000 v dc	913 3742 00
C259	CAPACITOR, CERAMIC: -0.0015 uf, ±20%, 6000 v dc	913 3539 00
CR201, CR202, CR203, CR024, CR212, CR213, CR214, CR215	DIODE: silicon type 1N1492	353 1661 00
CR205, CR207, CR208	RECTIFIER, SELENIUM: 15 ma	353 0153 00
CR206, CR209	DIODE: silicon type 1N1084	353 1567 00
CR210, CR211	DIODE: germanium type 1N34A	353 0103 00
DS201, DS202, DS203	LAMP, INCANDESCENT: 6.3 v, 0.945 w, 0.15 amps; 1-1/8 in. lg max overall	262 3240 00
DS204, DS205	LIGHT, INDICATOR: supplied with lens, miniature bayonet base T-3-1/4 bulb (DS204 p/o M201; DS205 p/o M202)	262 0626 00
F201	FUSE, CARTRIDGE: 3.2 amps, 125 v dc; ferrule terminal	264 0216 00
F202, F203	FUSE, CARTRIDGE: 10 amps, 250 v dc; ferrule terminal	264 0396 00
F204	FUSE, CARTRIDGE: 8 amps, 250 v dc; ferrule terminal	264 0395 00
F205	FUSE, CARTRIDGE: 1 amp, 250 v dc; time delay	264 4280 00
J201, F202, J203	JACK, TIP: ceramic insulation, brass contacts, accommodates phono plugs Cinch Mfg Corp part no. 1336	360 0088 00
J204	CONNECTOR, RECEPTACLE: 3 female contacts; 15 amps, 125 v dc; panel mtg	368 0115 00
K201	RELAY: 1C. 15 amps. 115 v ac or 26.5 v dc	970 1921 00
K202	RELAY, THERMAL: spst; 3 amps at 450 v ac or dc; heater, 117 v ac or dc	402 0331 00
K203	RELAY: 2A, 15 amps, 110 v ac & 2A, 1 amp, 110 v ac	970 1937 00
K204	RELAY: 1B, 2 amps, 115 v ac	970 1936 00
K205	RELAY: 2C, 2 amps, 175 w, 2-30 mc	970 1925 00
K206	RELAY: 1C, 1 amp, 28 v dc or 115 v ac	408 1074 00
L201	REACTOR: 3.5 hy; 500 ma; 40 ohms resistance	668 0356 00
L202	REACTOR: 8 hy; 500 ma; 45 ohms resistance	668 0355 00
L203	COIL, RADIO FREQUENCY: choke; 2.0 uh, ±10% at 350 kc	240 0084 00
M201	AMMETER: panel mtg; dc; 200-0-500 ua	458 0483 00
M202	AMMETER: panel mtg; dc; 0-1 amp	458 0484 00
R201, R215	RESISTOR, WIREWOUND: 8.2 ohms, ±10%, 100 w	710 2026 00
R202	RESISTOR, COMPOSITION: 470 ohms, ±10%, 2 w	745 5638 00
R203	RESISTOR, WIREWOUND: 5000 ohms, ±10%, 25 w	710 3542 00
R204	RESISTOR, WIREWOUND: 10.1 ohms, ±3%, 7 w	746 9186 00
R205, R206, R207	RESISTOR, WIREWOUND: 18,000 ohms, ±10%, 100 w	710 2133 00
R208	NOT USED	
R209	RESISTOR, FILM: 806 ohms, ±1%, 1/2 w	705 7779 00
R210	RESISTOR, COMPOSITION: 1000 ohms, ±5%, 2 w	745 5651 00
R211, R212, R213, R214, R229	RESISTOR, COMPOSITION: 1.0 megohm, ±5%, 2 w	745 5777 00
R216	NOT USED	
R217	RESISTOR, COMPOSITION: 0.20 megohms, ±5%, 1/2 w	745 1448 00
R218	RESISTOR, COMPOSITION: 2200 ohms, ±10%, 1 w	745 3366 00
R219	RESISTOR, VARIABLE, WIREWOUND: 5000 ohms, ±10%, 2 w	377 0305 00
R220	RESISTOR, COMPOSITION: 3300 ohms, ±10%, 1 w	745 3373 00
R221	RESISTOR, COMPOSITION: 1000 ohms, ±5%, 1/2 w	745 1351 00
R222, R223	RESISTOR, WIREWOUND: 10 ohms, ±5%, 12 w	747 1114 00
R224	NOT USED	
R225	RESISTOR, COMPOSITION: 56 ohms, ±10%, 2 w	745 5600 00
R226	RESISTOR, FILM: 10,000 ohms, ±1%, 2 w	705 4009 00
R227	RESISTOR, FILM: 1000 ohms, ±1%, 1/4 w	705 7096 00
R228	RESISTOR, FILM: 13,700 ohms, ±1%, 1/4 w	705 7308 00
R230	RESISTOR, WIREWOUND: 35 ohms, ±10%, 25 w	735 0204 00
R231	RESISTOR, COMPOSITION: 47,000 ohms, ±10%, 1 w	745 3422 00
R232	RESISTOR, WIREWOUND: 15,000 ohms, ±10%, 7 w	710 9001 00
R233	RESISTOR, WIREWOUND: 8.2 ohms, ±10%, 100 w	710 2026 00
R234	RESISTOR, COMPOSITION: 47 ohms ±10% 2 w	745 5030 00
S201	SWITCH, TOGGLE: 4 pdt; 125 v ac at 20 amps, 30 v dc at 30 amp	266 0072 00
S202	SWITCH, TOGGLE: spst; 250 v ac 3 amps	260 2613 00
S203	SWITCH, PUSH: spst, normally open; 0.5 amps at 250 v ac; black button marked "on"	260 2696 00
S204	NOT USED	
S205	SWITCH, PUSH: spst, normally open; 0.25 amps, 250 v ac	260 2548 00
S206	HIGH VOLTAGE SHORTING SWITCH: c/o the following	
	Tip (qty 1)	200 1421 00
	Disc Shorting (qty 1)	544 6905 002
	Insulator (qty 1)	544 6906 002
	Shaft (qty 1)	544 6918 002
	Plate (qty 1)	544 6919 002
	Spring-Compression (qty 1)	544 6922 002
S207	SWITCH, ROTARY: 2 pole, 6 positions, 2 sections; 1 moving and 7 fixed contacts	259 1027 00
S208	SWITCH, PUSH: spst; normally closed; 0.5 amps at 250 v ac; red button marked "off"	260 2697 00
T201	TRANSFORMER, POWER, STEP-UP: 2 pri. 115 v ea; sec. 1, 6320 v, CT, sec. 2, 245 v; 50/60 cps	662 0351 00
T202	TRANSFORMER; POWER, STEP-DOWN: pri 115 v; sec. 2.5 v, CT; 50/60 cps	662 0352 00
T203	TRANSFORMER, POWER, STEP-DOWN & STEP-UP: pri 115 v; sec. 1, 12.6 v; sec. 2, 125 v, CT; 50/60 cps	662 0353 00
V201, V202	ELECTRON TUBE: type 866A/866	256 0049 00
V203	ELECTRON TUBE: twin diode; type 12AL5	255 0197 00

HOOK-UP WIRE CODE

The characteristics of the hook-up wire used in this equipment are indicated by groups of symbols on the diagrams. Each symbol group consists of a maximum of three letters followed by a maximum of three numerals. When three letters are used the first indicates the type of wire, the second represents the size of wire, and the third is the letter "S", used only when the wire is shielded. When two letters are used, the first and second letters indicate either the type and size of wire or the size of wire and shielding, respectively. When one letter is used it indicates the wire size only. The first numeral indicates the color of the wire body and the second and third numerals, if any, represent the colors of tracers, all numerals being in accordance with the standard EIA and MIL-W-16878 color code.

The symbols are assigned according to the following table.

TYPE OF WIRE CODE	
LETTER	TYPE OF WIRE
A	Cotton Braid Over Plastic (Formerly AN-J-C-48)
B	Busbar, Round Tinned
C	MIL-W-16878 Type B (#20 and Larger) (600 Volts)
D	Miniature Wire, MIL-W-16878 Type B (#22 and Smaller)
E	
F	Extra Flexible Varnished Cambric
G	
H	Kel-F (Monochlorotrifluoroethylene)
J	
K	Neon Sign Cable (15,000 Volts)
L	Silicone
M	
N	Single Conductor Stranded (Not Rubber Covered)
P	Single Conductor Stranded (Rubber Covered)
Q	
R	MIL-W-16878 Type C (1000 Volts)
T	Teflon, MIL-W-16878 Type E (600 Volts)
V	MIL-W-16878 Type D (3000 Volts)
W	Teflon, MIL-W-16878 Type EE (1000 Volts)
X	
Y	
Z	Acetate Yarn, Telephone Type

SIZE OF WIRE CODE	
LETTER	SIZE
A	#22 AWG
B	#20
C	#18
D	#16
E	#14
F	#12
G	#10
H	#8
J	#6
K	#4
L	#2
M	#1
N	#0
P	#00
Q	#000
R	#0000
T	#28
V	#26
W	#24
X	#19
Y	#30
Z	

COLOR CODE	
NUMBER OR LETTER	COLOR
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray (Slate)
9	White
a	Clear
b	Tan
c	Pink
d	Maroon
e	Light Green
f	Light Blue

EXAMPLES

MIL TYPE C, #22AWG, UNSHIELDED WIRE, WHITE WITH RED AND GREEN TRACERS:

R	A	9	25	4-1/4
Type of Wire	Size of Wire	Color of Body	Color of Tracers --	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE C, #16AWG, SHIELDED WIRE (SINGLE), WHITE WITH RED AND GREEN TRACERS:

R	D	S	9	25	4-1/4
Type of Wire	Size of Wire	Shielded	Color of Body	Color of Tracers --	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE B, #22AWG, SHIELDED WIRE (MULTIPLE), WHITE, AND WHITE WITH RED TRACER:

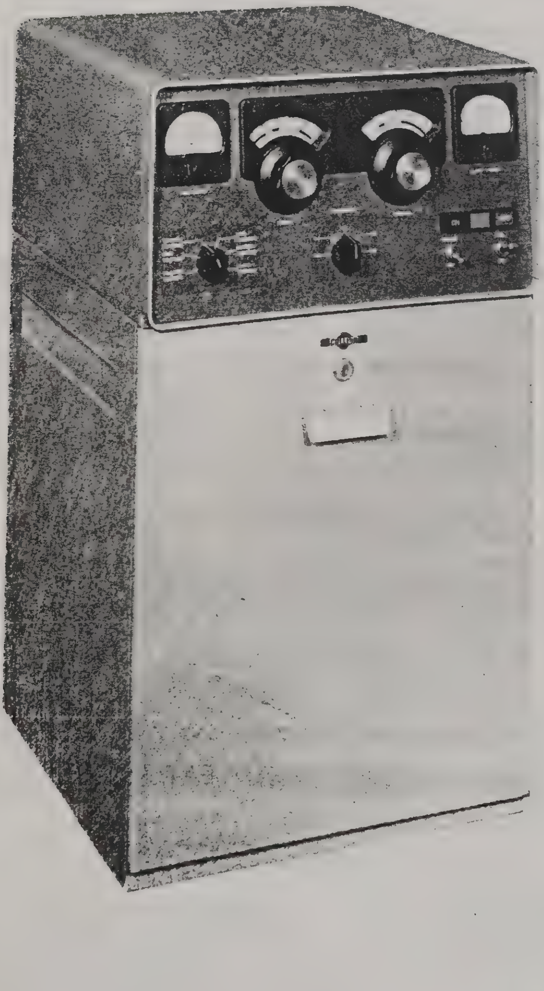
D	A	S	(9)	(92)	4-1/4
Type of Wire	Size of Wire	Shielded	First Conductor	Second Conductor --	Length of Wire in Inches (Includes Stripping & Tinning)

COLLINS RADIO COMPANY

INSTRUCTION BOOK

R-F LINEAR AMPLIFIER

30S-1



COLLINS RADIO COMPANY

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No other warranties, expressed or implied, shall be applicable to said equipment, and the foregoing shall constitute the Buyer's sole right and remedy under the agreements contained in these paragraphs. In no event shall Collins have any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

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ADDRESS:

Collins Radio Company
Customer Return Goods Department
Cedar Rapids, Iowa

INFORMATION NEEDED:

(A) Type number, name, and serial number of equipment
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(C) Date placed in service
(D) Number of hours of service
(E) Nature of trouble
(F) Cause of trouble if known

HOW TO ORDER REPLACEMENT PARTS. When ordering replacement parts, you should direct your order as indicated below and furnish the following information insofar as applicable. To enable us to give you better replacement service, please be sure to give us complete information.

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Service Parts Department
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(A) Quantity required
(B) Collins part number (9 or 10 digit number) and description
(C) Item or symbol number obtained from parts list or schematic
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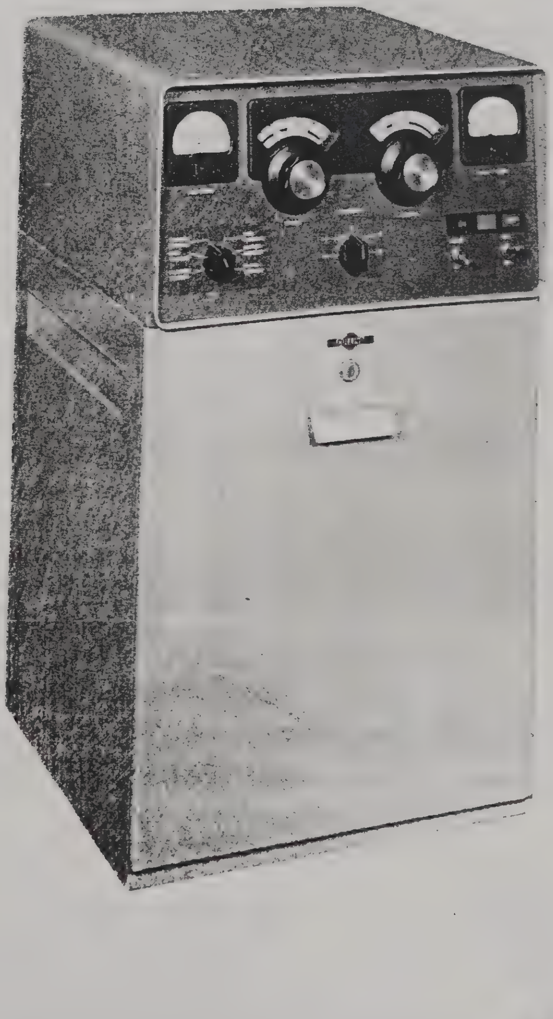
(E) Unit subassembly number (where applicable)

INSTRUCTION BOOK

R-F LINEAR AMPLIFIER

30S-1



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INSTRUCTION BOOK

R-F LINEAR AMPLIFIER

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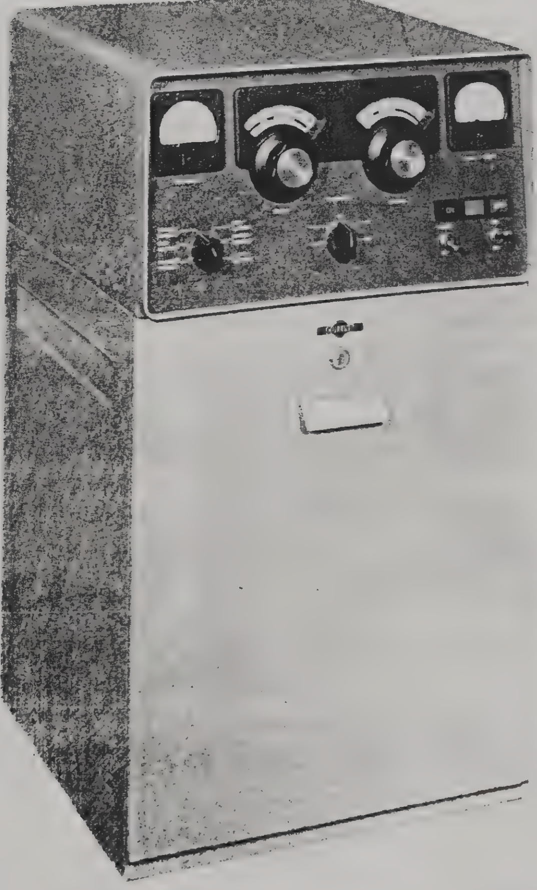

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INSTRUCTION BOOK

R-F LINEAR AMPLIFIER

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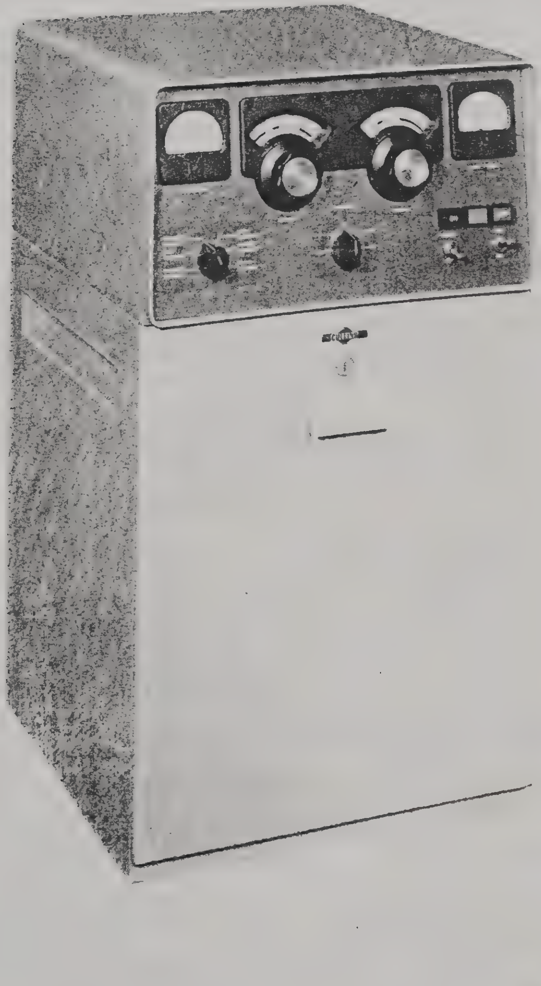

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INSTRUCTION BOOK

30S-1
R-F LINEAR AMPLIFIER

520 5879 00
4th EDITION, 1 DECEMBER 1959

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1959

CEDAR RAPIDS, IOWA, U.S.A.

PRINTED IN THE UNITED STATES OF AMERICA

1.1 DESCRIPTION.

The 30S-1 R-F Linear Amplifier consists of a one-stage linear amplifier and the necessary power supplies. It is capable of maximum legal input power in the amateur bands between 3.5 and 29.7 mc. It operates in either CW or SSB service with any exciter (such as KWM-1, KWM-2, or 32S-1) capable of 80 watts PEP output. In addition, the amplifier may be operated outside the amateur bands at any frequency between 3.4 and 30 mc by retuning its input circuits.

TABLE 1. EQUIPMENT FURNISHED WITH 30S-1

QUANTITY	DESCRIPTION	FUNCTION	COLLINS PART NUMBER
1	A-c power cable, three number 12 wires, 10 feet long, with lugs on one end.	A-c power	545 3123 00
2	Microphone cables, 10 feet long, with phono plug (part number 361 0062 00) on each end.	Alc and antenna relay cables	426 2029 00
1	RG-58/U cable, 20.5 feet long, with phono plug (part number 361 0062 00) on each end.	R-f input cable	545 3121 00
1	RG-8A/U cable, 10 feet long, with type C connector (part number 357 9261 00) on each end.	R-f output cable	545 3122 00
1	Bag containing fuses.	Spares	544 6885 00
1	Polyethylene spiral wrapping six feet long.	Lacing the interconnecting cables	152 3370 00

2.1 INSTALLATION AND ADJUSTMENTS.

a. Set the 30S-1 on the floor beside the operating desk.

b. Connect to 32S-1, KWM-1, or KWM-2 exciter as shown in figures 1, 2, and 3. A length of polyethylene spiral wrapping is included with the 30S-1 for making a neat bundle of interconnecting wires behind the desk.

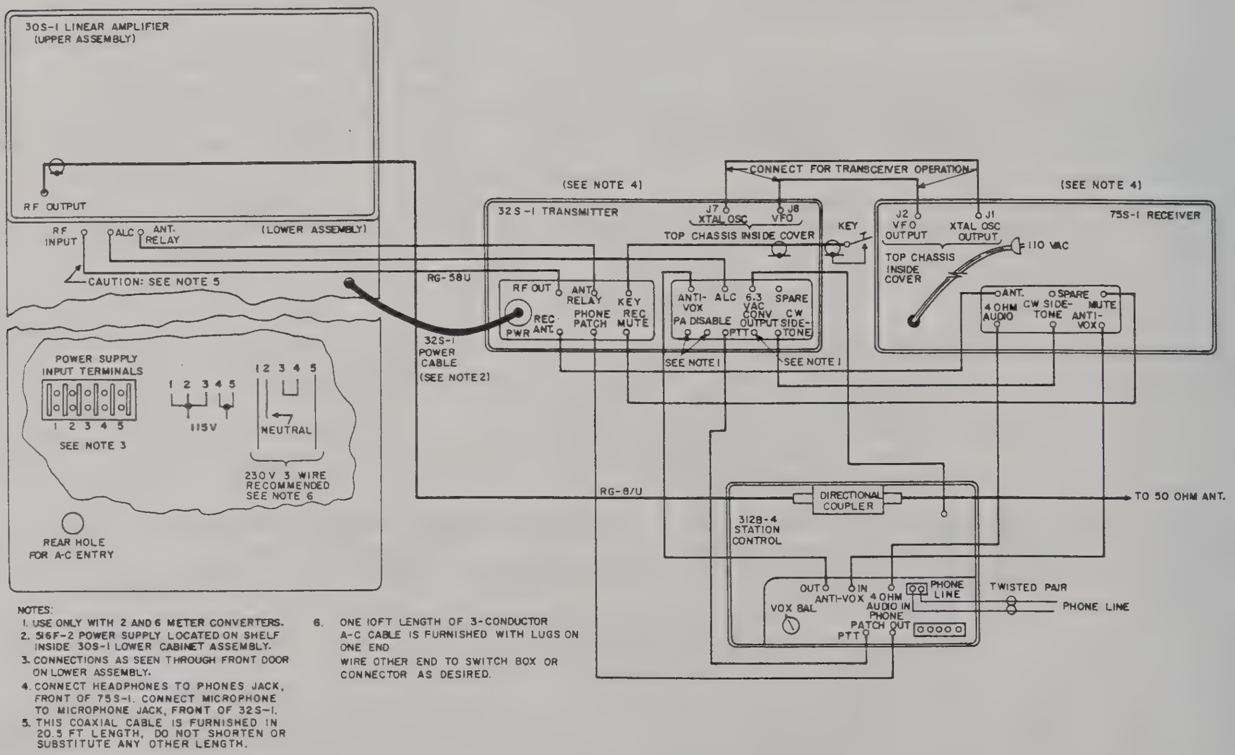
c. If KWM-1 models above serial number 861 are used with the 30S-1, it will be necessary to bring out alc and "ground-on-transmit" connections from J5 (of KWM-1). Make the alc connection to pin 19 on J5, and make the "ground-on-transmit" connection to pin 20 of the same jack. This will allow the switching circuits of the KWM-1 to control the antenna changeover relays of the 30S-1 when connected to J203 on the 30S-1.

d. If KWM-1 models below serial number 861 are used with the 30S-1, it is necessary to make connections inside the KWM-1 for alc. Use an ohmmeter to locate the feedthrough capacitor, C169, which is connected to pin 19 of J5. Connect a wire from this feedthrough capacitor to pin 7 of tube socket XV10. It also is necessary to connect an external dropping resistor and relay, as shown in the detail of figure 3, for KWM-1 control of changeover relays in the 30S-1. Locate the feedthrough capacitor, C206, which is connected to pin 20 of J5 (in KWM-1) in same manner as pin 19 was located above. Connect a wire from terminal 8 of TB1 in KWM-1 to C206. External to the KWM-1, connect a 10,000-ohm, 5-watt resistor and relay coil in series from J5-20 to a ground on the rear of the KWM-1 chassis. Use a relay, such as Collins part number 972 1346 00, with a 10,000-ohm, 10-ma coil and a set of normally open contacts. Connect the normally open contacts through a piece of shielded wire (or microphone cable) and a phono plug to ANT. RELAY (J203) on the 30S-1. This arrangement will allow KWM-1 switching of 30S-1 changeover relays. BE CAREFUL to protect the operator from the 260-volt B+ present on the resistor and relay coil connections.

NOTE

The r-f cable supplied for connecting the 32S-1 or the KWM-2 to the 30S-1 is 20.5 feet long. DO NOT cut this cable. This length is optimum in maintaining the low-distortion figure for which the equipment was designed. An additional 2.5 feet of cable with connectors is supplied for connecting the KWM-1 output to the 30S-1. This makes a total of 23 feet for the KWM-1 connection.

e. Loosen the exciter power supply shelf, shown in figure 4, and tip it back out of the way. This may be done by removing three flathead machine screws along the left side of the shelf (heads of screws inside cabinet) and two sheet-metal screws along the back edge (heads of screws outside cabinet).

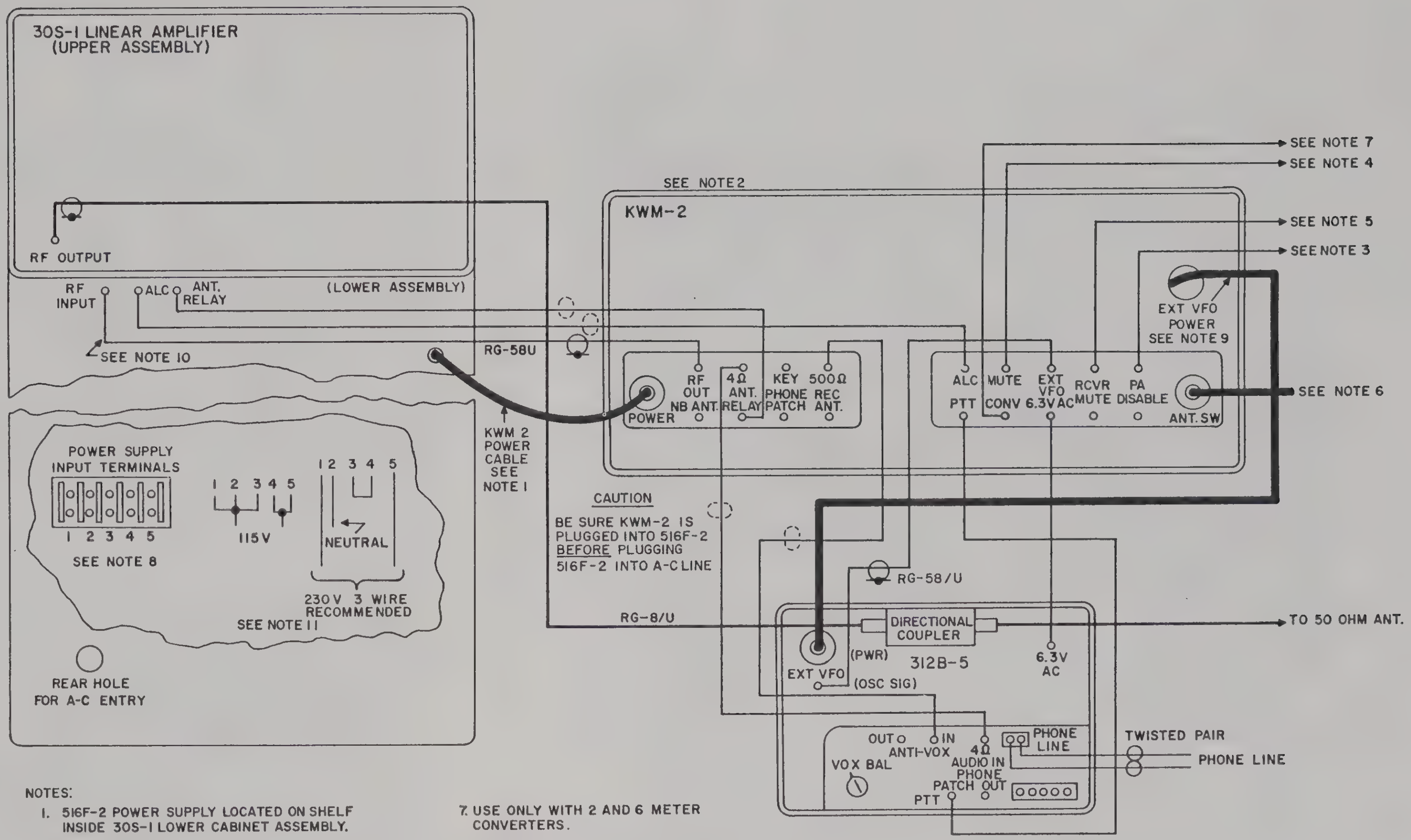


NOTES:

1. USE ONLY WITH 2 AND 6 METER CONVERTERS.
2. 516F-2 POWER SUPPLY LOCATED ON SHELF INSIDE 30S-1 LOWER CABINET ASSEMBLY.
3. CONNECTIONS AS SEEN THROUGH FRONT DOOR ON LOWER ASSEMBLY.
4. CONNECT HEADPHONES TO PHONES JACK, FRONT OF 75S-1. CONNECT MICROPHONE TO MICROPHONE JACK, FRONT OF 32S-1.
5. THIS COAXIAL CABLE IS FURNISHED IN 20.5 FT LENGTH, DO NOT SHORTEN OR SUBSTITUTE ANY OTHER LENGTH.
6. ONE 10FT LENGTH OF 3-CONDUCTOR A-C CABLE IS FURNISHED WITH LUGS ON ONE END
WIRE OTHER END TO SWITCH BOX OR CONNECTOR AS DESIRED.

C352-03-4

Figure 1. Station Interconnections with 32S-1 and 75S-1

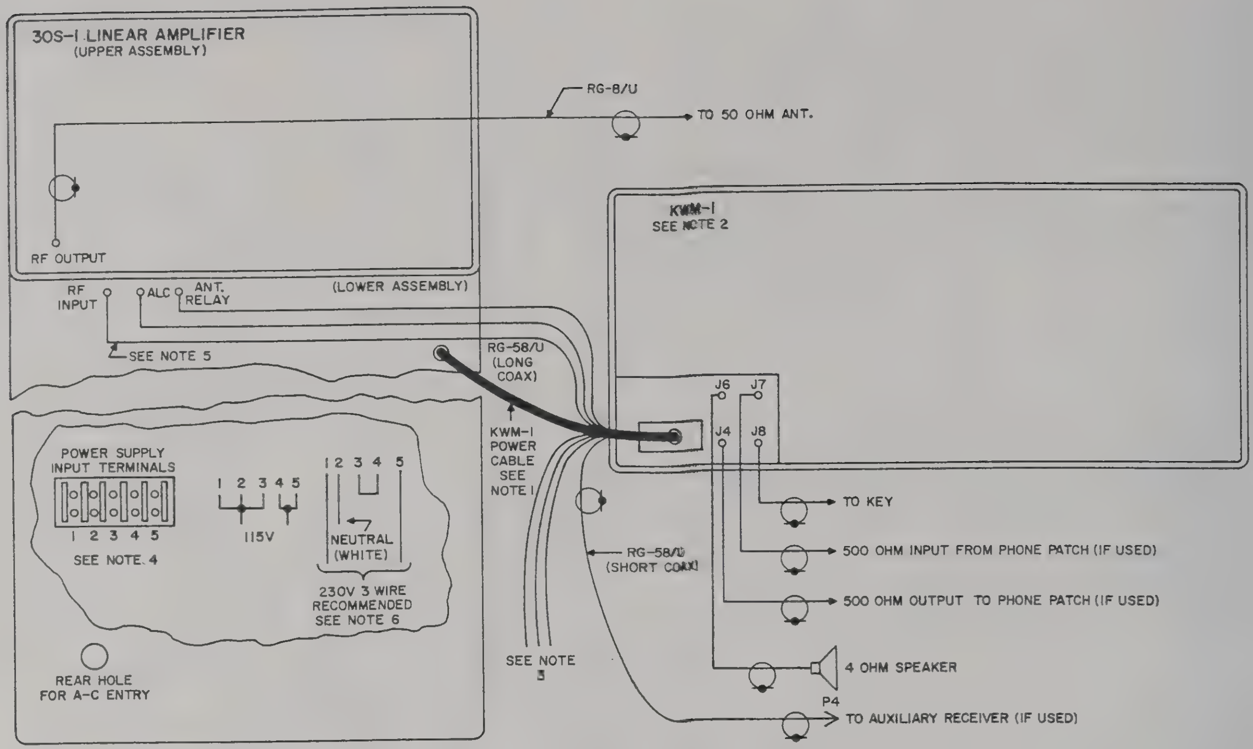


NOTES:

1. 516F-2 POWER SUPPLY LOCATED ON SHELF INSIDE 30S-1 LOWER CABINET ASSEMBLY.
2. CONNECT HEADPHONES TO PHONE JACK ON FRONT OF KWM-2. CONNECT MICROPHONE TO MIC JACK ON FRONT OF KWM-2.
3. USE ONLY WITH 2 AND 6 METER CONVERTERS. (CAUTION +275V DC PRESENT HERE)
4. TO EXTERNAL SWITCH IF CONVERTERS ARE HERE.
5. TO EXTERNAL RECEIVER, IF USED.
6. CABLE TO ANTENNA SWITCHING RELAYS. (IF USED)
7. USE ONLY WITH 2 AND 6 METER CONVERTERS.
8. CONNECTIONS AS SEEN THROUGH FRONT DOOR ON LOWER ASSEMBLY.
9. EXTERNAL VFO POWER CABLE PLUGS INTO J17 ON CHASSIS.
10. THIS CABLE IS FURNISHED WITH 30S-1 IN 20.5 FT LENGTH. DO NOT CUT.
11. 10 FT LENGTH OF 3 WIRE (EACH NO. 12) CONDUCTOR WITH LUGS ON ONE END. CONNECT OTHER END TO SWITCHBOX OR PLUG AS DESIRED.

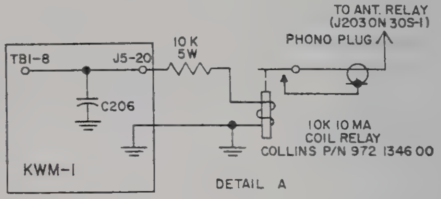
C487-02-4

Figure 2. Station Interconnections with KWM-2



NOTES:

1. 516F-1 POWER SUPPLY LOCATED ON SHELF INSIDE 30S-1 LOWER CABINET ASSEMBLY.
2. CONNECT HEADPHONES TO PHONE JACK ON FRONT OF KWM-1, CONNECT MICROPHONE TO MIC JACK ON FRONT OF KWM-1.
3. CABLE TO ANTENNA SWITCHING RELAYS. (IF USED)
4. CONNECTIONS AS SEEN THROUGH FRONT DOOR ON LOWER ASSEMBLY.
5. THIS CABLE IS FURNISHED WITH 30S-1 IN 20.5 FT LENGTH. DO NOT CUT. ADD THE 2.5 FT LENGTH TO BRING TOTAL LENGTH TO 23 FT.
6. 10 FT LENGTH OF 3 WIRE (EACH NO. 12) CONDUCTOR WITH LUGS ON ONE END. CONNECT OTHER END TO SWITCH BOX OR PLUG AS DESIRED.
7. SEE DETAIL A FOR EXT RELAY CONNECTIONS FOR KWM-1 SWITCHING OF 30S-1 (KWM-1 SERIAL NUMBERS BELOW 861)


TO ANT. RELAY (J203 ON 30S-1)
PHONO PLUG
TB1-8
J5-20
10 K 5W
C206
10K 10 MA COIL RELAY COLLINS P/N 972 1346 00
KWM-1

DETAIL A

C432-14-4

Figure 3. Station Interconnections with KWM-1

f. Mount the high-voltage power supply transformer (shipped in separate carton) over the mounting holes in the bottom plate of the compartment. Be sure to position the transformer with the terminals at the front as shown in figure 4. Secure the transformer to the cabinet floor with the four screws supplied. In order to insert the rear screws in the mounting holes, it may be necessary to use beeswax or chewing gum on the screwdriver bit to hold the screw for positioning.

g. Connect the center tap leads (both numbered 8) to the ceramic post insulator, shown in figure 4, just in front of the 866A filament transformer, T202.

h. Connect the remaining two secondary leads (numbered 7 and 9) to the lower terminals of the two surge-suppressing resistors mounted behind the rectifier tube sockets.

i. Connect the wires of the cable to the terminal strip across the top edge of the transformer frame according to the wire code information of figure 4.

j. Replace the exciter power supply shelf. Secure to the back edge of the transformer with spacers and screw provided with the shelf. Replace the two sheet-metal screws along the back edge of the shelf, and replace the three flathead machine screws along the left side of the shelf.

k. If the exciter power supply is preferred on the operating desk, disregard note 2 of figure 1 and note 1 of figure 3.

l. If the exciter power supply is preferred in the lower compartment of the 30S-1, remove the 516F-2 from its case before mounting on the shelf in the 30S-1. Plug the 32S-1 (or KWM-2) into the 516F-2. Plug the 516F-2 into J204 (inside 30S-1 on flange of shelf).

m. Connect the 30S-1 power supply input terminals to the a-c line according to the information given in figures 1 through 3. Run the a-c power leads through the entry conduit from the rear of the cabinet. Connect the white wire to neutral. The a-c input terminals are shown in figure 4.

n. Install the rectifier tubes. Install plate caps on the rectifier tubes.

o. Install the PA tube. Make sure the thermal switch, K202, is turned out of the way before inserting the PA tube. BE SURE THE PA TUBE IS INSERTED ALL THE WAY INTO THE SOCKET AND NOT HANGING ON THE EDGE OF THE COOLING CHIMNEY. Turn

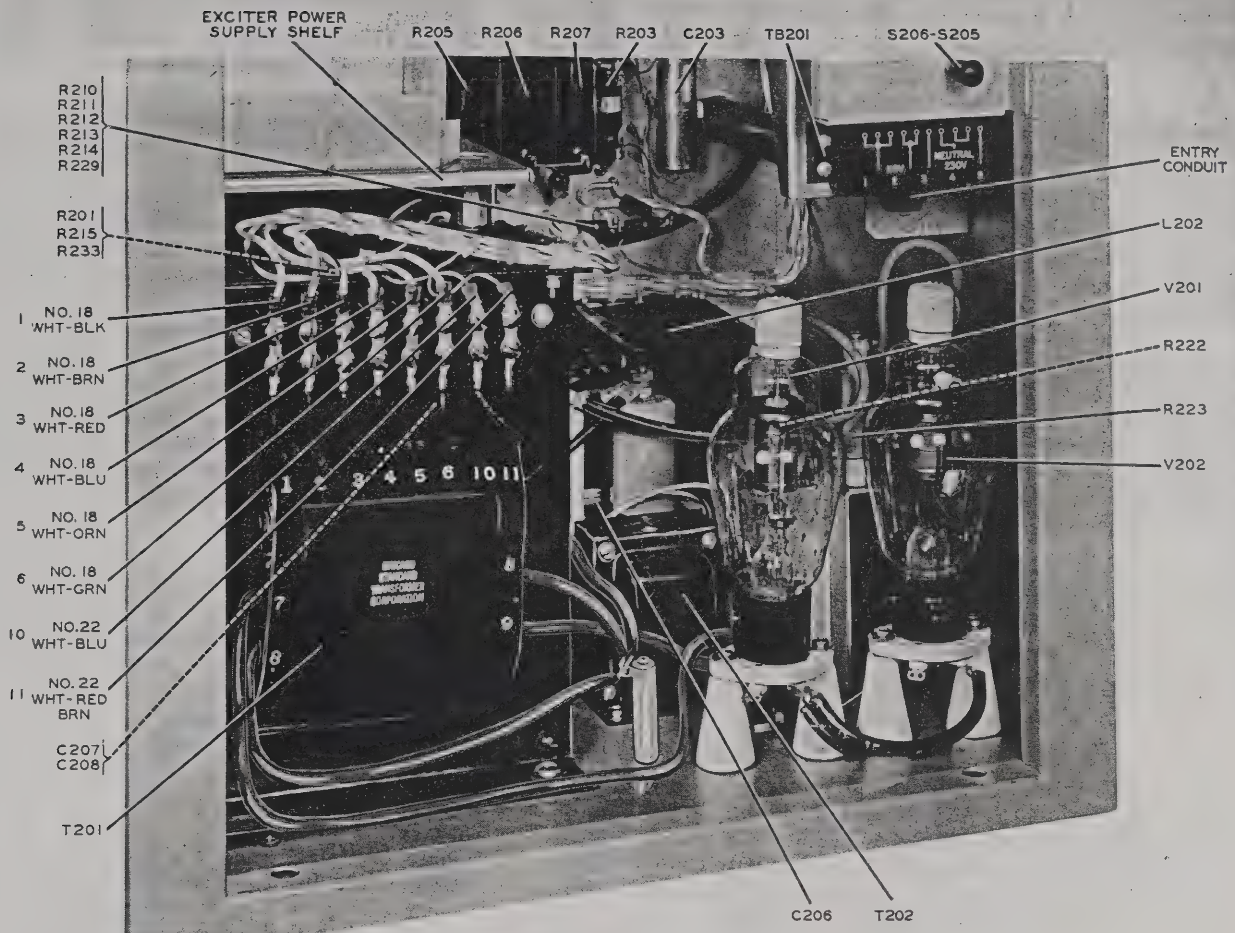


Figure 4. Power Supply Compartment Bottom, Parts Location and Wiring C432-11-P

the tube 1/3 turn clockwise against the stops. Secure clamp around tube plate radiating pins. Replace K102 in proper position.

p. Refer to figure 6. Turn POWER-OFF switch (1) to POWER position, and let the rectifier filaments age in for thirty minutes. DO NOT apply power to the rectifier plates until this aging period is over.

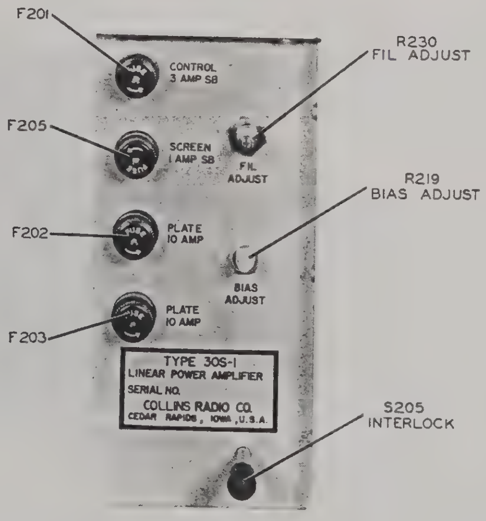
q. Set the SSB-CW switch (5) to SSB position and the MULTIMETER switch (4) to FILAMENT VOLTAGE position. Be sure the plate power is off and the rectangular red pilot lamp (7) is out. The following adjustments are made without excitation.

r. Set filament voltage to 6.0 volts a-c with FIL ADJUST. Refer to figure 5.

s. Set MULTIMETER switch (4) to PLATE VOLTAGE position, and press the plate ON pushbutton (6).

NOTE

Due to the three-minute delay of time-delay relay K202, plate voltage will not come on until three minutes after filament voltage has been applied. During this three-minute wait, exciter may be operated as a low-power station.



C432-06-P

Figure 5. Filament and Bias Adjustment Locations

WARNING

Do not make bias adjustments with power on. DO NOT BLOCK THE POWER SUPPLY INTERLOCK SWITCH. High voltage present in the power supply is dangerous to life.

t. After the three-minute time delay has elapsed, press plate ON button and the rectangular red pilot lamp should light. Plate voltage should be indicated on the multimeter (9).

u. Set exciter MIC GAIN control full counterclockwise to produce zero drive, and set the exciter EMISSION switch to TUNE position. Idling plate current will be indicated on the 30S-1 PLATE CURRENT meter (8).

v. Remove the front cover from the power supply compartment; make a small change in setting of BIAS ADJUST; replace cover and read PLATE CURRENT meter. Repeat until no-signal plate current is 200 ma.

w. When these adjustments are completed, press the plate OFF pushbutton (2).

3.1 OPERATION IN SSB OR CW SERVICE. (Refer to figure 6.)

a. Set POWER-OFF switch (1) to POWER position.

b. Set exciter bandswitch to desired band and exciter meter switch to ALC. Adjust exciter idling plate current to 50 ma. Be sure 30S-1 and exciter alc jacks are connected together. When the three-minute time delay has elapsed, press plate ON pushbutton. Adjust exciter ALC ZERO for exciter meter indication of zero alc. Press plate OFF pushbutton.

c. Tune and load the exciter into the antenna or dummy load, whichever is connected to RF OUTPUT jack J103 at the rear of the 30S-1. Tune and load the 32S-1 or KWM-2 according to its instruction book, EXCEPT load only to 200 ma plate current. This change in procedure for the 32S-1 or KWM-2 is necessary to realize the low system distortion for which this equipment was designed.

NOTE

Use a 100-watt dummy load (such as Ohmite D-101, 52 ohms) unless antenna and feed line system present swr not exceeding 1.25 to 1.

CAUTION

Do not leave the dummy load connected to the 30S-1 output with the 30S-1 power on unless dummy load used has power dissipating capacity equal to or greater than the output power of the 30S-1.

d. Reduce exciter output to zero by reducing microphone gain to zero.

e. Press 30S-1 plate ON button, and turn 30S-1 BANDSWITCH (3) to desired band.

f. Set MULTIMETER switch (4) to TUNING & LOADING position.

g. Set SSB-CW switch (5) to desired mode of operation.

h. Disconnect dummy load and connect antenna to RF OUTPUT jack.

i. Press plate ON pushbutton (6). The pilot lamp (7) should light if the three-minute time delay has elapsed.

j. With exciter EMISSION switch in LOCK KEY position, increase exciter output by increasing microphone gain until 350-ma plate current is indicated on PLATE CURRENT meter (8).

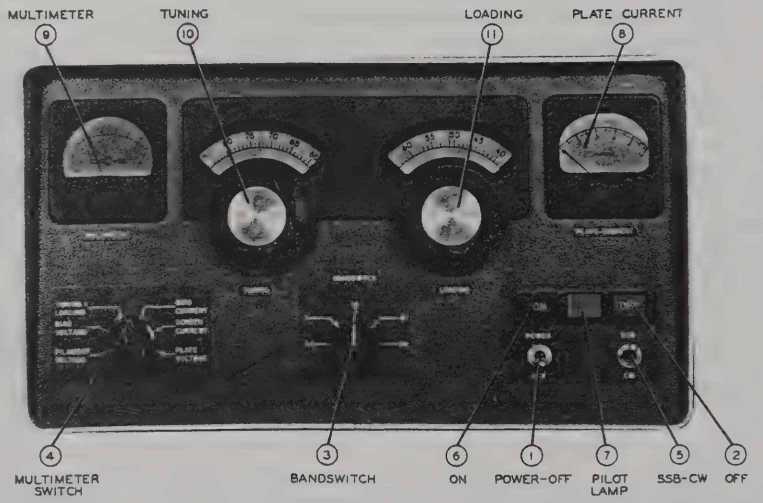


Figure 6. 30S-1 R-F Linear Amplifier, Operating Controls

k. Observe the MULTIMETER (9). Adjust the TUNING control (10) for MULTIMETER dip, and adjust the LOADING control (11) for MULTIMETER zero until the meter indication is zero at the dip.

l. Adjust exciter output until 30S-1 plate current is 300 ma for SSB or 400 ma for CW.

m. Redip and reload with the TUNING and LOADING controls, keeping multimeter indication at zero.

n. Recheck PLATE CURRENT meter indication for proper value as given in step l. Repeat steps l and m, as necessary, until power amplifier is loaded to 400 ma for CW or 300 ma for SSB. DO NOT switch from SSB to CW (or from CW to SSB) while operating. BE SURE 30S-1 plate voltage is off when changing setting of SSB-CW switch (5).

o. For SSB operation, set 32S-1 (or KWM-2) EMISSION switch to USB or LSB. Set exciter METER switch to ALC. Adjust MIC GAIN for meter indication of 6 db for 32S-1 (or S6 for KWM-1 or KWM-2) for peak voice readings in normal operation of the exciter. For CW operation, set EMISSION switch to CW. Station is now ready to operate.

p. Pressing the plate OFF pushbutton (2) automatically switches the exciter to the antenna for low-power operation.

CAUTION

Wait at least five seconds after pressing plate OFF button (2) before pressing plate ON button (6). This delay is necessary to allow the step-start circuit to recover.

NOTE

The cathode input circuit on the 3.5-mc band is factory tuned for minimum input vswr at 3.8 mc. The vswr will increase for operation on other parts of the band. This will cause small changes in the normal load setting of the exciter. It is possible, but not necessary, to adjust L114 for minimum vswr at a favored part of the 3.5-mc band.

q. Table 2 lists full-scale and normal meter indications for all scales of the multimeter. Full-scale indication on the PLATE CURRENT meter is 1000 ma, and normal indication on this meter is 400 ma for CW or 300 ma for SSB. According to FCC regulations, the drive power to the grounded-grid amplifier must be added to PA plate power input to determine total final amplifier plate power input. The above plate current ratings are set to keep amplifier input legal.

CAUTION

If the 30S-1 is to be driven by an exciter not having automatic load control (alc), keep drive power and modulation level low to produce no grid current. Monitor PA grid current continuously while transmitting, and keep drive level at point which just produces a slight kick in grid current indication.

TABLE 2. MULTIMETER SCALE VALUES

MULTIMETER SWITCH SETTINGS	FULL-SCALE INDICATIONS	NORMAL INDICATIONS
FILAMENT VOLTAGE	10 volts a-c	6.0 volts a-c
BIAS VOLTAGE	-100 volts d-c	Voltage necessary to set idling plate current to 200 ma.
TUNING & LOADING	Not applicable	0 when 30S-1 is properly loaded.
GRID CURRENT	1.0 ma	Never more than 0.2 ma in CW, 0 in SSB
SCREEN CURRENT	50 ma	Disregard. Use only for maintenance purposes.
PLATE VOLTAGE	5000 volts	2000 for CW 3000 for SSB

4.1 CIRCUIT DESCRIPTION.

Refer to figures 7 and 12. The power amplifier stage is a single, ceramic tetrode which is cathode driven. The grid is grounded for r-f by capacitor C104. The screen grid is connected directly to ground.

Pi network broad-tuned circuits match the 50-ohm input to the cathode impedance which is approximately 100 ohms. The 20.5-foot length of cable is necessary between 32S-1 driver and 30S-1 input circuits because there must be an even multiple of 180-degree phase shifts between driver plate and power amplifier grid. The cable length and the 30S-1 input circuits together accomplish this. The necessity of an even multiple of 180-degree phase shifts is due to the fact that modulation components cause a change in the resistive PA cathode impedance which is translated to a shift in reactive impedance at the driver plate. The shift in reactive impedance at the driver plate results in phase modulation of the driver and increases the total over-all distortion of the system. A 2.5-foot additional length of cable is furnished to bring the total interconnecting cable length to 23.0 feet for use with the KWM-1 as driver. Drive power required for maximum legal input on SSB is 80 watts PEP. The plate is tuned by a pi network consisting of C120, L109, L104, C121, and C122. When the plate power is disconnected by depressing the OFF pushbutton, the exciter output is connected through normally closed contacts of relays K205 and K101 to the antenna. When the ON pushbutton is depressed, the exciter power is connected to the power amplifier cathode, and the antenna connection is transferred to the output of the power amplifier plate circuit. Automatic load control (alc) signal from the grid circuit of the power amplifier is coupled through transformer T102 to the alc rectifier, V204. The rectified and filtered alc voltage is applied to J202 for use in the exciter to prevent overdriving the power amplifier.

Additional protective devices include time-delay relay K202, step-start relay K201, grid overload relay K206, and plate overload relay K204 in the power supply, and thermal overload relay K102 in the power amplifier compartment. The thermal overload relay, K102, protects the power amplifier tube from overdissipation and loss of cooling air. Its bimetallic strip has contacts connected in series with the interlock system and is mounted in the air stream from V101. Current from transformer T103 is passed through the bimetallic strip. If the air stream fails, the temperature of the bimetallic strip increases, opening the interlock circuit and removing voltages from the power amplifier. If overdissipation occurs in the plate circuit, the higher air temperature causes K102 to operate.

CAUTION

> Adjustment for proper operating points of K102 are made at the factory. DO NOT ALTER this adjustment or loss of thermal protection for V101 may result.

Refer to figures 7 and 12. Since the power amplifier screen grid is at d-c ground potential, it is necessary to provide the cathode with negative 200 volts in order to supply screen voltage which is 200 volts higher than the cathode potential. Effective plate-cathode

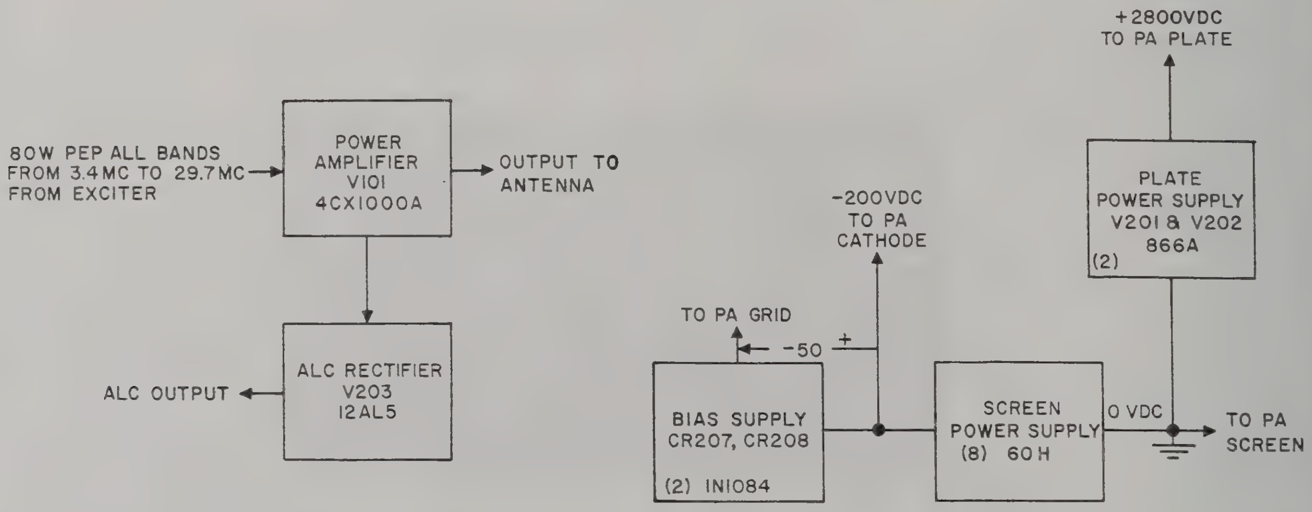


Figure 7. 30S-1 R-F Linear Amplifier, Block Diagram

CAUTION!

READ BEFORE INSTALLING

PA TUBE IN 30S-1

a. Loosen the mounting screw of the thermal relay, K102, and move it aside so it will not interfere in tube installation.

b. Remove the tube from the carton. Inspect to be certain that tube base contacts are not damaged.

c. Insert the tube GENTLY into the socket, making sure the tube base contacts are not jammed or bent in the process. Insert the tube all the way into the socket so that the bottom portion of the tube plate cooling fins is inside the cooling chimney.

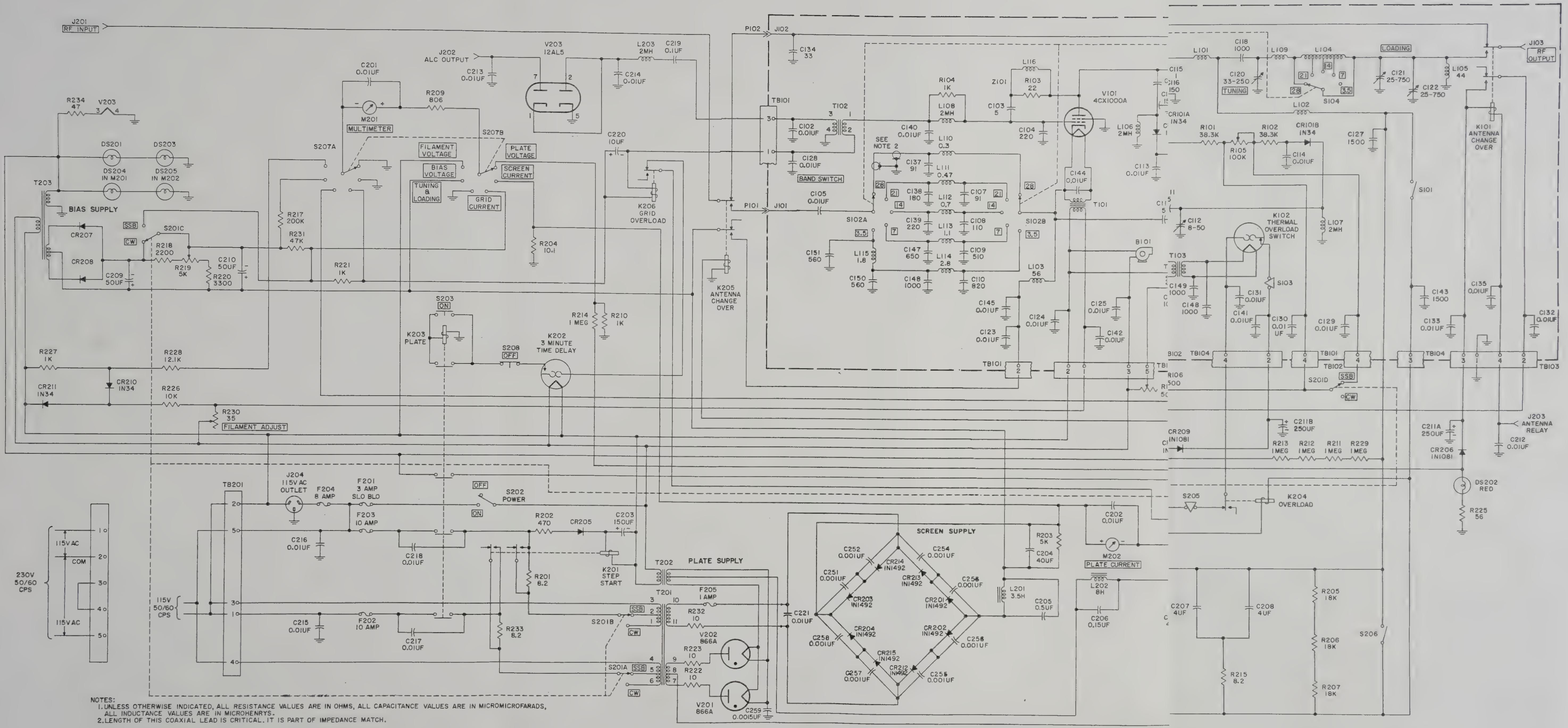
d. Check that the top of the tube plate cooling fins is approximately 7/8 inch above the top edge of the black cooling chimney. Turn the tube clockwise to tighten the tube base contacts under the socket contacts.

CAUTION

If an attempt is made to tighten the tube into its contacts when the tube is not properly bottomed in its socket, both tube and socket may be damaged. The manufacturer assumes no responsibility for tubes or sockets damaged by improper handling or installation.

e. Tighten the clamp around the tube plate cooling fins. This makes electrical connection to the plate of the tube.

f. Place the thermal relay, K102, where it will be in the airstream flowing through the cooling fins of the tube, and tighten the screw holding K102. See figure in instruction book which shows the power amplifier tube properly installed and the proper operating position of K102. Inspect the r-f compartment to be sure there are no electrical short circuits, and close the top cover.



NOTES:
1. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS, ALL INDUCTANCE VALUES ARE IN MICROHENRYS.
2. LENGTH OF THIS COAXIAL LEAD IS CRITICAL. IT IS PART OF IMPEDANCE MATCH.

Figure 12. 30S-1 R-F Linear Amplifier, Over-all Schematic Diagram

C432-12-6

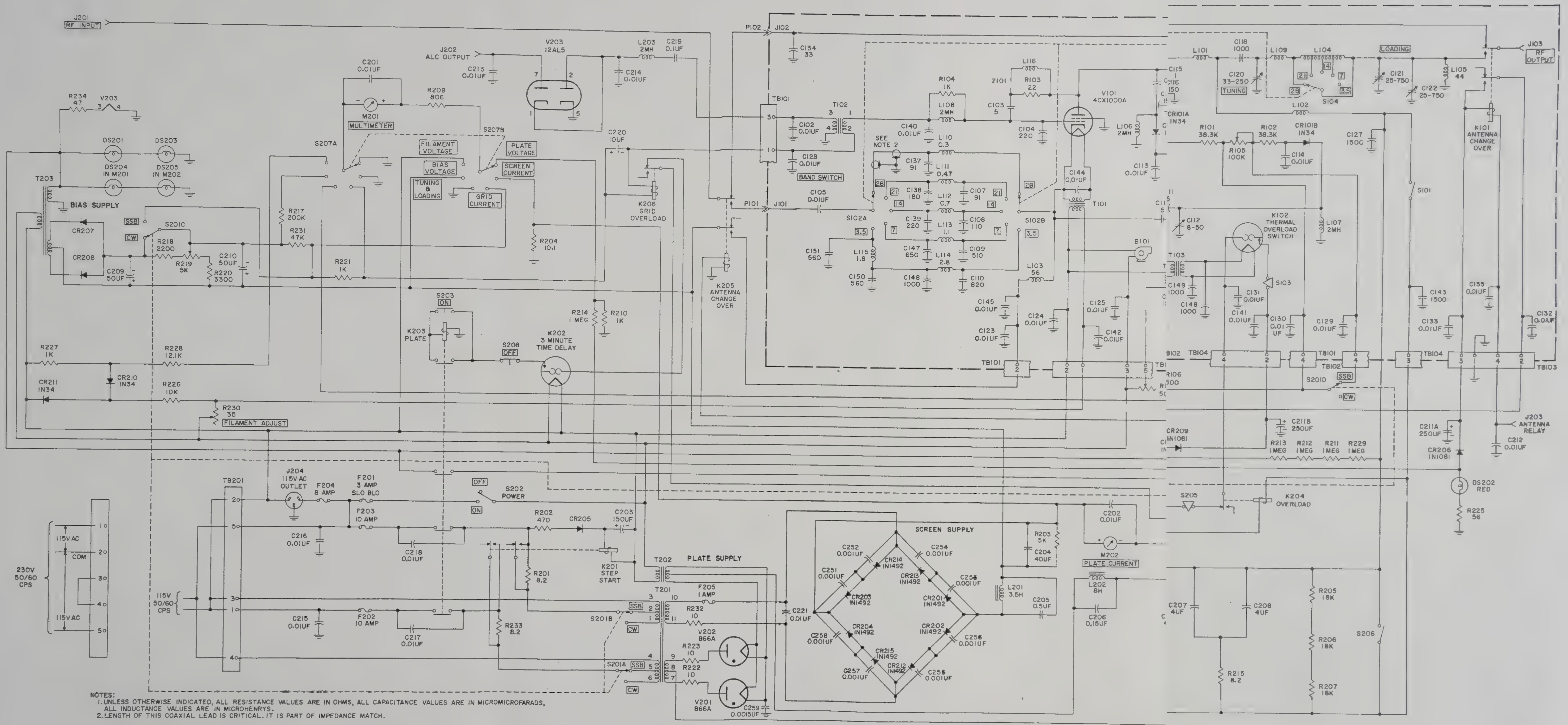


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Figure 12. 30S-1 R-F Linear Amplifier, Over-all Schematic Diagram

C432-12-6

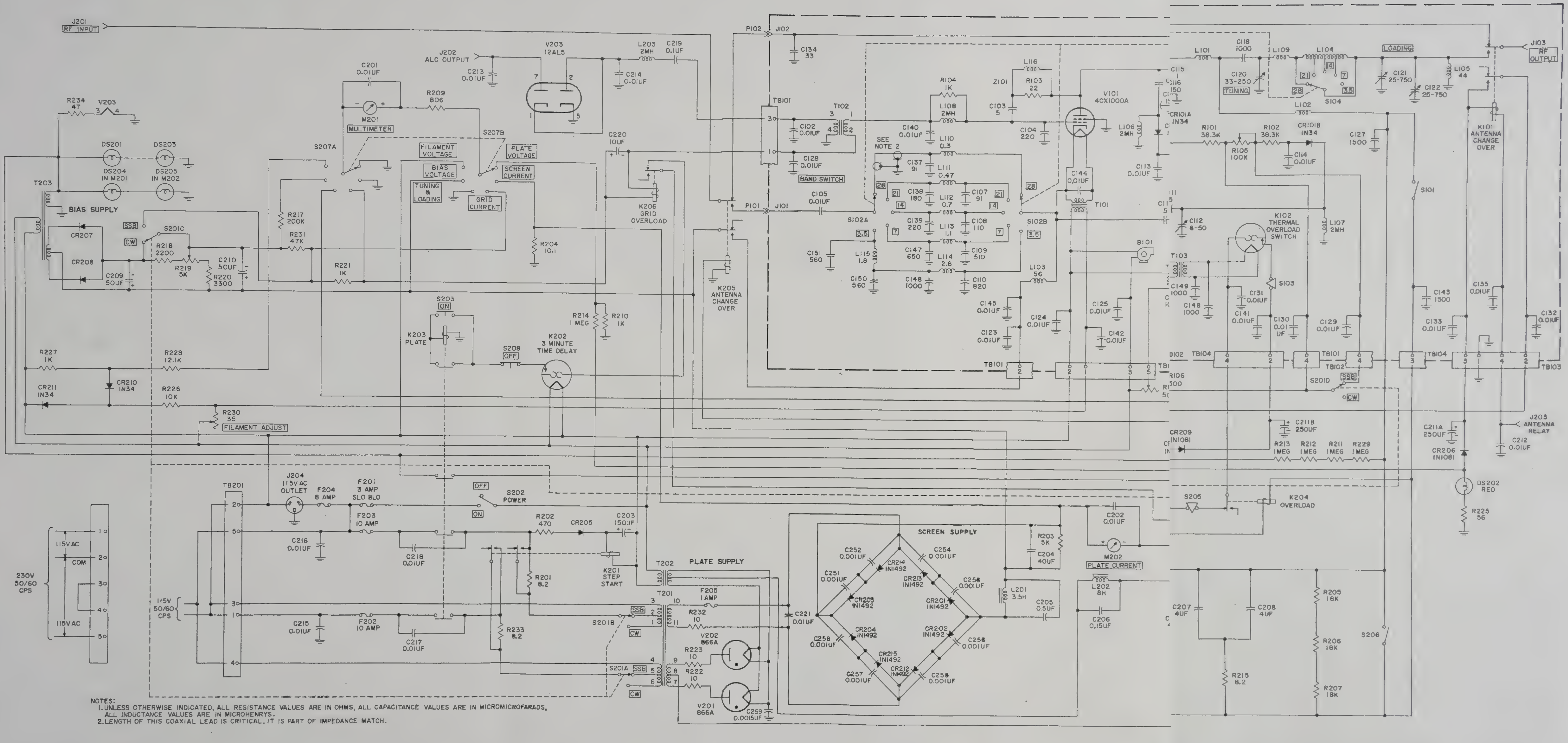

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Figure 12. 30S-1 R-F Linear Amplifier, Over-all Schematic Diagram

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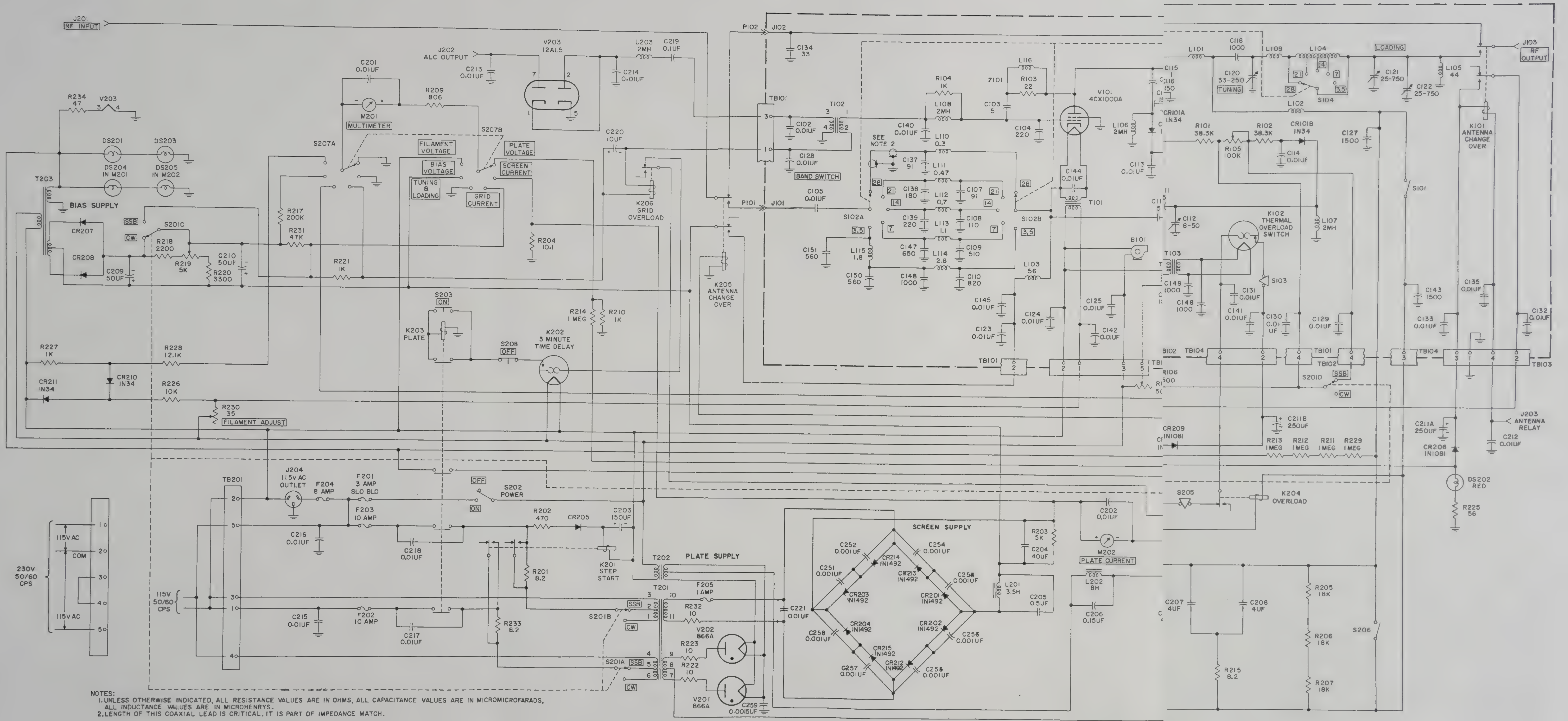

NOTES:
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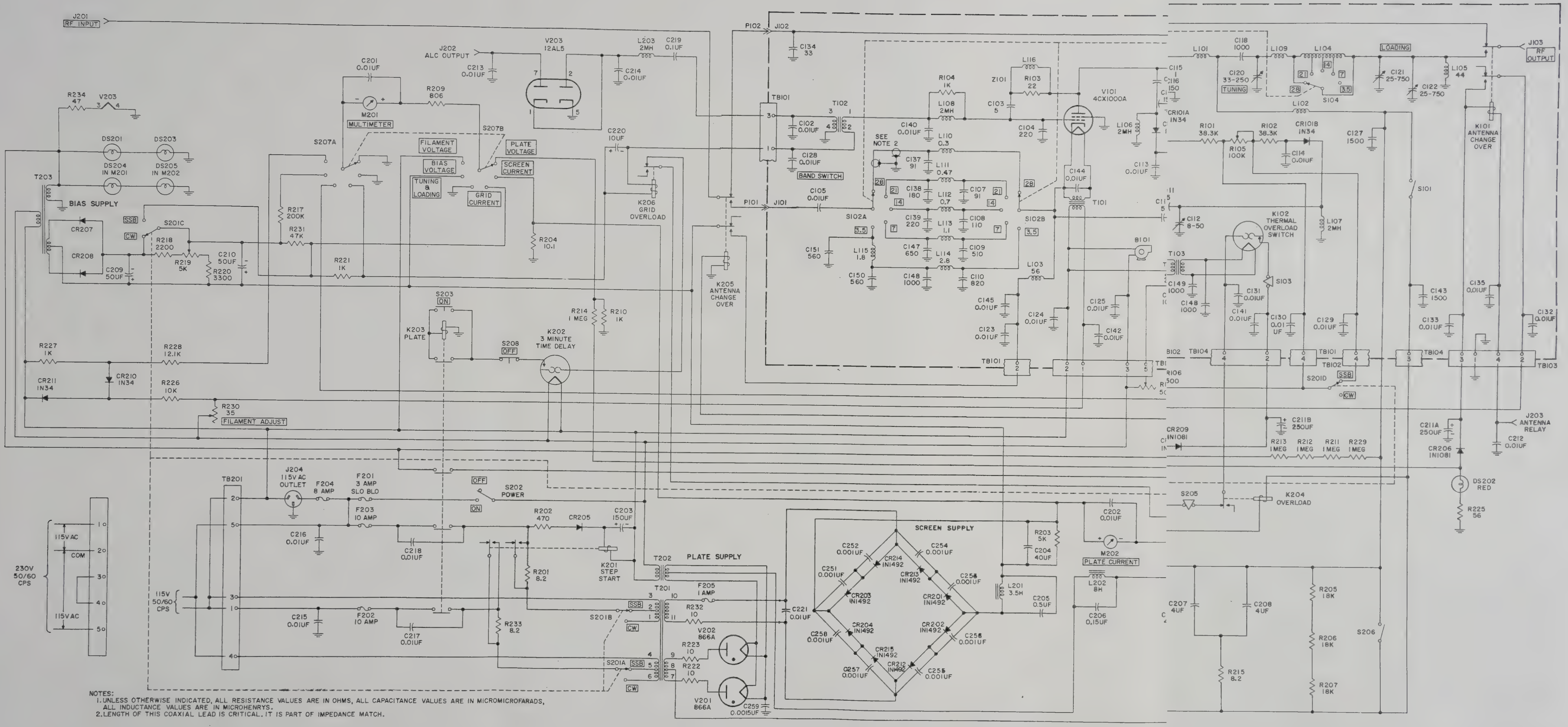
Figure 12. 30S-1 R-F Linear Amplifier, Over-all Schematic Diagram

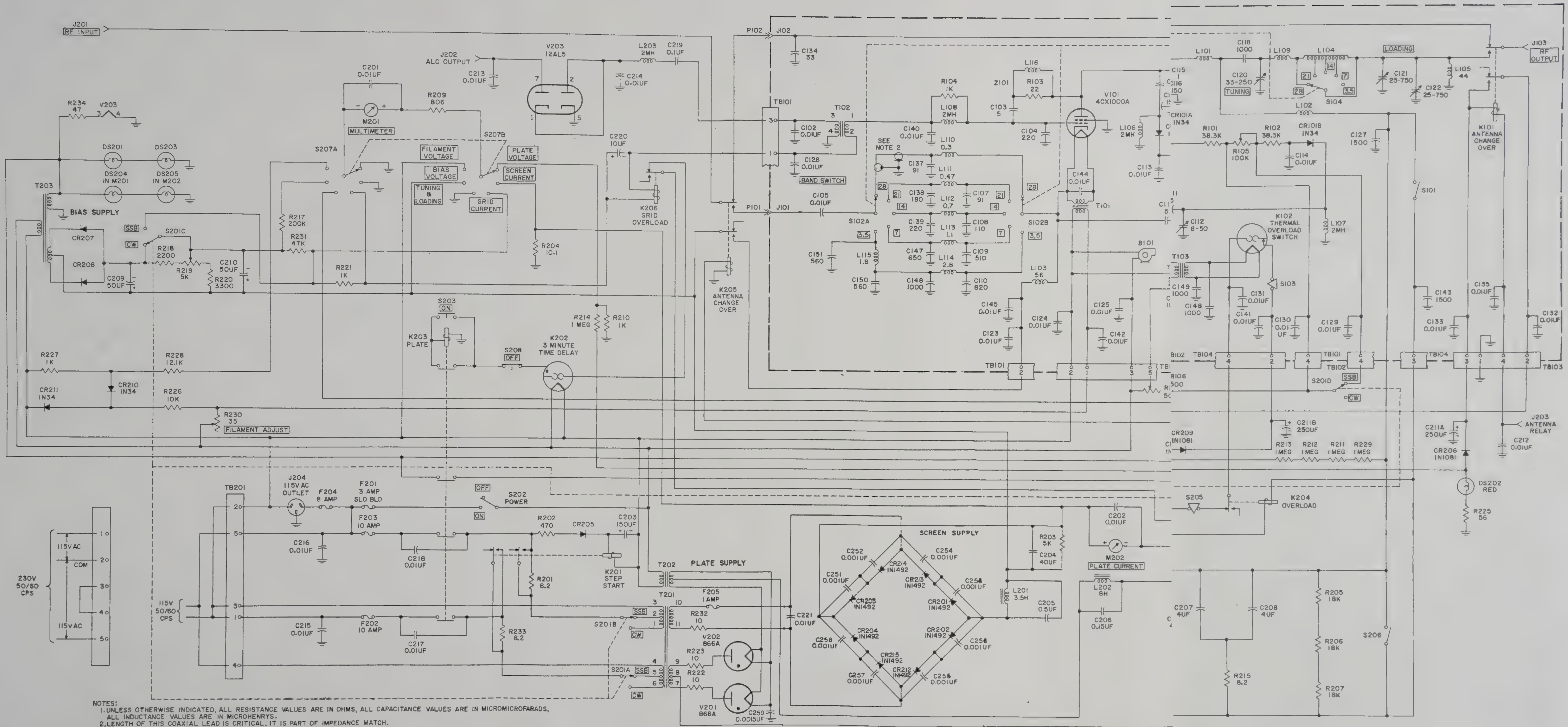
C432-12-4



NOTES:
1. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS, ALL INDUCTANCE VALUES ARE IN MICROHENRYS.
2. LENGTH OF THIS COAXIAL LEAD IS CRITICAL. IT IS PART OF IMPEDANCE MATCH.

Figure 12. 30S-1 R-F Linear Amplifier, Over-all Schematic Diagram

C432-12-6



NOTES:
1. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS, ALL INDUCTANCE VALUES ARE IN MICROHENRYS.
2. LENGTH OF THIS COAXIAL LEAD IS CRITICAL. IT IS PART OF IMPEDANCE MATCH.

C432-12-6

Figure 1 12. 30S-1 R-F Linear Amplifier, Over-all Schematic Diagram

CAUTION!
READ BEFORE INSTALLING
PA TUBE IN 30S-1

a. Loosen the mounting screw of the thermal relay, K102, and move it aside so it will not interfere in tube installation.

b. Remove the tube from the carton. Inspect to be certain that tube base contacts are not damaged.

c. Insert the tube GENTLY into the socket, making sure the tube base contacts are not jammed or bent in the process. Insert the tube all the way into the socket so that the bottom portion of the tube plate cooling fins is inside the cooling chimney.

d. Check that the top of the tube plate cooling fins is approximately 7/8 inch above the top edge of the black cooling chimney. Turn the tube clockwise to tighten the tube base contacts under the socket contacts.

CAUTION

> If an attempt is made to tighten the tube into its contacts when the tube is not properly bottomed in its socket, both tube and socket may be damaged. The manufacturer assumes no responsibility for tubes or sockets damaged by improper handling or installation.

e. Tighten the clamp around the tube plate cooling fins. This makes electrical connection to the plate of the tube.

f. Place the thermal relay, K102, where it will be in the airstream flowing through the cooling fins of the tube, and tighten the screw holding K102. See figure in instruction book which shows the power amplifier tube properly installed and the proper operating position of K102. Inspect the r-f compartment to be sure there are no electrical short circuits, and close the top cover.

voltage is the sum of the screen-plate supply (2800 volts) and the cathode-screen supply (200 volts). Control grid bias is referenced to the cathode. All plate and screen current passes through the 200-volt supply, and only plate current through the 2800-volt supply. All relays are operated from d-c sources except time-delay relay K202 and thermal overload relay K102. Switching from SSB to CW operation automatically lowers plate voltage and changes grid bias. The amplifier operates with approximately 3000 volts plate-to-cathode in SSB service and approximately 2000 volts plate-to-cathode in CW service. The power supplies may be connected to either 115-volt lines or to 230-volt, 3-wire service lines. The 230-volt, 3-wire connection is preferred.

5.1 MAINTENANCE.

5.1.1 GENERAL. No special test equipment is required for adjustment of the input r-f circuits if the station includes an r-f wattmeter and directional coupler such as are included in the 312B-4 Station Control. If it is necessary to adjust the loading indication of the multimeter, required test equipment includes a 2500-watt, noninductive dummy load and a two-tone audio oscillator (750 and 1900 cps). If it is necessary to remove the PA tube, slide thermal interlock switch aside, loosen clamp, turn tube 1/3 turn counterclockwise, and pull out. To replace PA tube, insert in socket and turn 1/3 turn clockwise against stops. Tighten clamp. Return thermal interlock switch to original position.

CAUTION

If any replacements are made in input circuits, be sure to retain the 6.1-foot coaxial lead between S102A and L110. This length of cable is part of the matching network and is critical.

5.1.2 BLOWER LUBRICATION. Every 1000 hours of operation (approximately 6 months of normal use), lubricate the blower motor bearings with a few drops of lightweight oil. Sewing-machine oil is adequate. Do not overlubricate.

5.1.3 ALIGNMENT OF R-F INPUT CIRCUITS.

a. Set exciter to TUNE and 30S-1 SSB-CW switch to SSB. Apply 20 watts of single tone drive from the station exciter. Exciter frequency should be 3.6 mc if CW operation only is favored, 3.8 mc if both CW and phone are desired, or 3.9 mc if phone operation only is favored.

b. Load 30S-1 into a 2500-watt, 50-ohm dummy load. Adjust 3.5-mc coil for minimum input vswr (1.5 to 1 or lower). This adjustment is accessible through the first hole in the cover (when facing front panel and counting from left to right). Refer to figure 7. Make all adjustments through holes in the cover. Calculate vswr from wattmeter readings in 32S-1 output.

c. Repeat at 7.2 mc, 14.3 mc, 21.3 mc, and 28.6 mc, adjusting L113, L112, L111, and L110, respectively.

5.1.4 BIAS AND FILAMENT VOLTAGE ADJUSTMENT. Occasionally check the FILAMENT VOLTAGE reading on the MULTIMETER and the no-signal plate current on the PLATE CURRENT meter. If these readings are not 6.0 volts a-c and 200 ma d-c, respectively, adjust as in paragraph 2.1.

5.1.5 LOADING INDICATOR ADJUSTMENT. The loading indicator circuit may be checked for accuracy as follows:

a. Connect a 50-ohm, 2500-watt, noninductive dummy load to the output of the 30S-1 at J103.

NOTE

Do not use lamp bulbs. Their resistance changes with temperature.

b. Set up the 30S-1 and the exciter for SSB operation on 14.3 mc and introduce a two-tone (750 and 1900 cps) signal to the microphone input of the exciter. Adjust the audio oscillators for equal amplitude of the two tones.

c. Advance the exciter MIC GAIN control until the exciter metering circuit indicates about 6 db of automatic load control (alc).

d. Set MULTIMETER switch to SCREEN CURRENT position. Adjust TUNING control to produce peak screen current indication. Using the left hand on the TUNING control and the right hand on the LOADING control, adjust TUNING and LOADING controls for screen current peak until screen current peaks at 0. During this procedure, increase exciter MIC GAIN, as necessary, to maintain alc reading of 6 db.

e. Set the MULTIMETER switch to TUNING & LOADING position. Adjust TUNING control to dip the meter indication. If the circuits are in adjustment, the multimeter will indicate 0.

f. If the meter indication in step e is not satisfactory, adjust C112 until the meter indication is zero. See figure 8 for location of capacitor C112.

g. Switch the exciter and 30S-1 to CW. Remove the two-tone input. Set the MULTIMETER switch to GRID CURRENT position. Increase MIC GAIN setting on the exciter to produce 0.2 ma power amplifier grid current.

CAUTION

DO NOT allow PA grid current to exceed 0.5 ma or power amplifier tube V101 will be damaged.

h. Set MULTIMETER switch to TUNING & LOADING position. Adjust the TUNING control to produce a dip in the multimeter indication. Adjust LOADING control for peak PLATE CURRENT meter indication. Continue adjusting TUNING control for multimeter dip and LOADING control for PLATE CURRENT meter peak until the PLATE CURRENT meter indicates 480 ma and the MULTIMETER indicates 0. If the circuits are in adjustment, the MULTIMETER will read 0 when the plate current is 480 ma.

i. If the multimeter indication in step h is not satisfactory, adjust R105 until multimeter indication is zero. See figure 10 for location of R105.

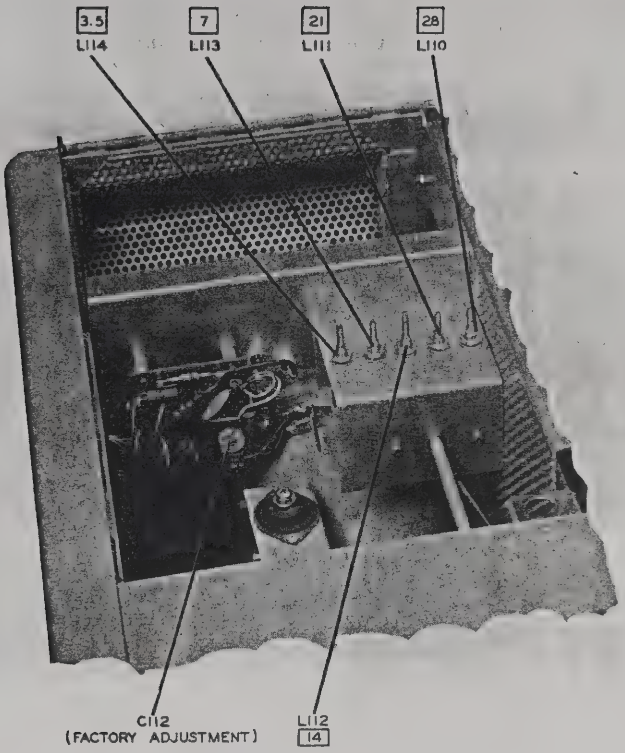
5.1.6 DIAL CORD REPLACEMENT. Refer to figure 9. Remove all control knobs. Remove the flathead screws securing the front panel to the cabinet. These screws are arranged across the top front and bottom front edges of the cabinet. The power supply front cover must be removed to gain access to the bottom screws. Do not loosen the screws at the sides of the cabinet. Remove the front panel from the cabinet, exposing subpanel and dial drive assemblies. Remove the broken or defective dial cord and replace with proper length of the new cord from Collins part number 432 1009 00. When ordering dial cord, be sure to state desired length in feet. If possible, measure the required length of the new cord to be cut by the length of the old cord removed. Note that switch drive cords are not under spring tension. These cords are pulled and tied tight in order to bring switches into positive detent. Replace front panel and knobs. If switches are not aligned to same relative positions after the dial cord replacement, loosen the shaft couplers and align switches and knobs for proper positions. Retighten couplers.

6.1 SPECIFICATIONS.

Size	30-5/8 in. high, 17 in. wide, 18-3/4 in. deep (over-all dimensions)
Weight	160 pounds
Frequency range	3.5 mc - 29.7 mc, covering all amateur bands. By retuning input coils as necessary, the following general coverage bands may be covered:

Frequency Band	Total Coverage
3.5 mc	3.4 - 6.5 mc
7.0 mc	6.5 - 9.5 mc
14.0 mc	9.5 - 15.0 mc
21.0 mc	15.0 - 22.0 mc
28.0 mc	22.0 - 30.0 mc

Mode	SSB or CW
Type of service	Intermittent commercial or amateur
Plate power input	CW - 1000 watts input SSB - Nominal average input of 1000 watts with speech. Distortion products at this level are at least 35 db down from signal.
Drive power requirements	SSB - 80 watts PEP. CW - 60 watts.
Primary power requirements	230 volts a-c, 3-wire, single-phase, at 15 amperes or 115 volts a-c at 30 amperes.
Input impedance	52 ohms
Output impedance	52 ohms unbalanced with swr not to exceed 2 to 1.
Noise level	40 db down from output signal with 1-kw single-tone input.
Harmonic output	All harmonics at least 50 db down from output signal.
Vacuum tubes	PA - 4CX1000A (1) Rectifiers - 866A (2) Alc rectifier - 12AL5 (1)



C432-04-P

Figure 8. Input Tuned Circuit Adjustments Locations

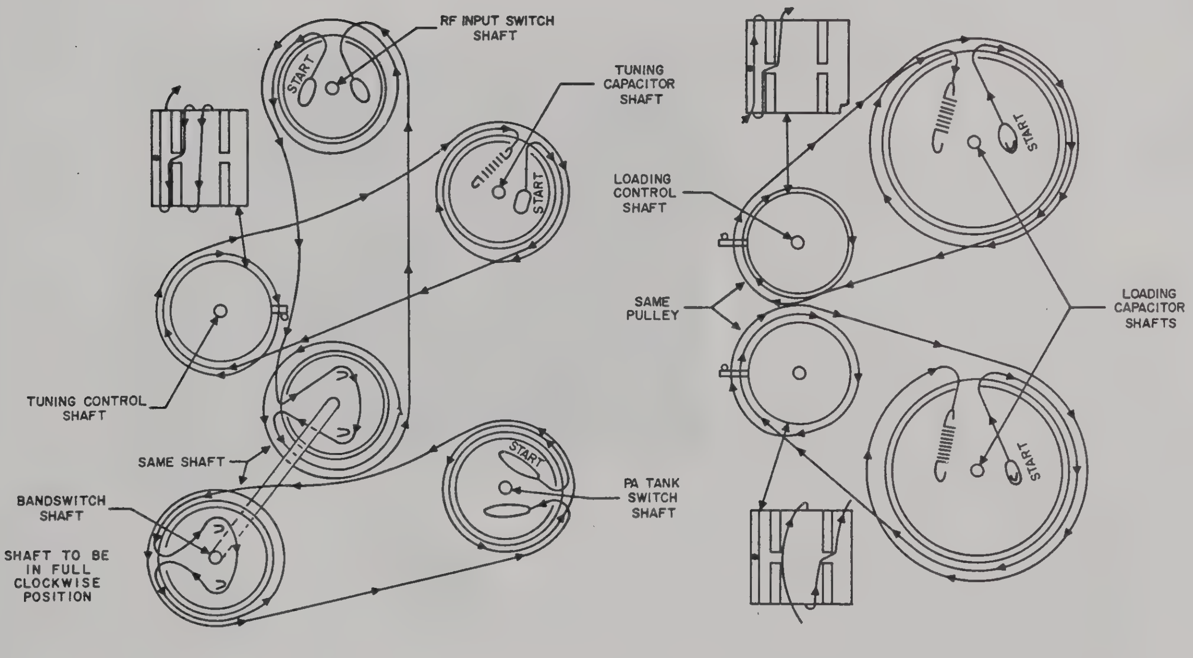
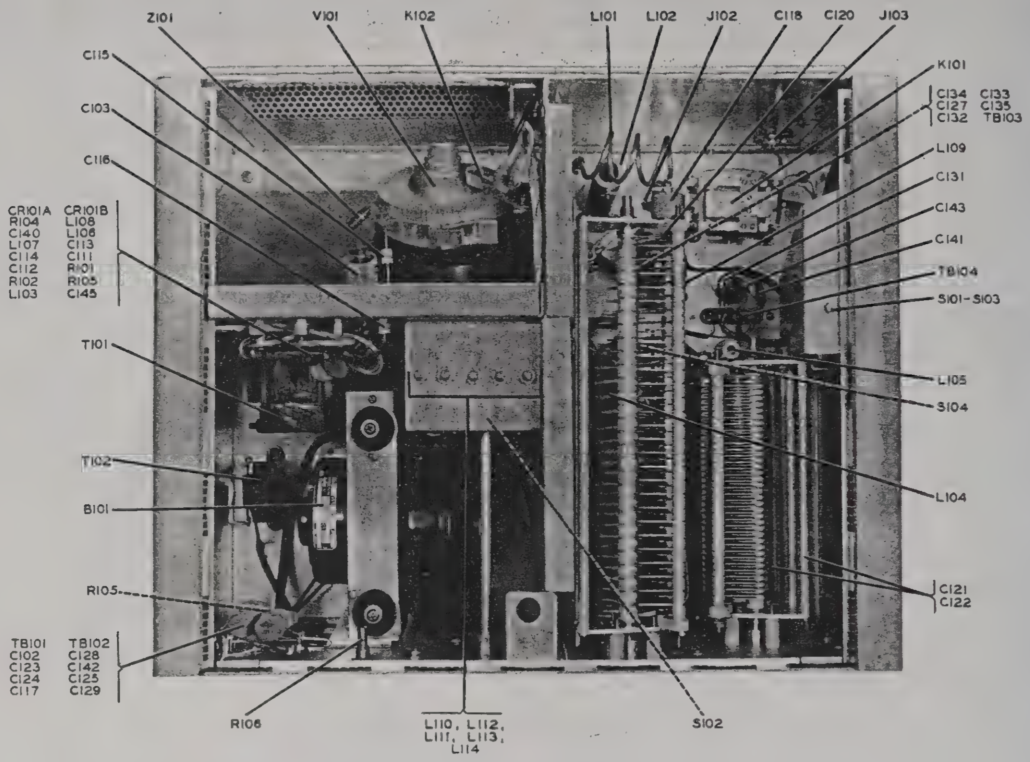


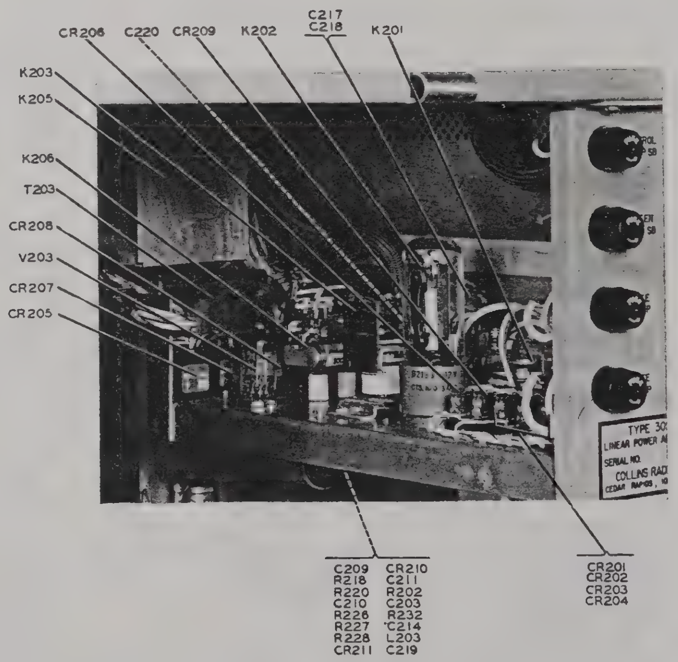
Figure 9. Dial Cord Replacement Diagram

C432-07-P



C432-09-P

Figure 10. Power Amplifier Compartment, Parts Location



C432-10-P

Figure 11. Shelf in Power Supply Compartment, Parts Location

7.1 PARTS LIST.

Figures 3, 8, 10, and 11 show parts identification of the 30S-1. Following is a parts list for the 30S-1.

ITEM	DESCRIPTION	COLLINS PART NUMBER
	30S-1 R-F LINEAR AMPLIFIER	522 1286 00
	Upper Cabinet	544 6873 00
B101	BLOWER: direct connected; 115 v ac, 60 cps, single phase, 0.30 amp, 1550 rpm	009 1407 00
C101	NOT USED	
C102, C105, C113, C114, C117, C123, C125, C128, thru C133, C135, C140, C141, C142, C144, C145	CAPACITOR, CERAMIC: 10,000 uuf, +100% -20%, 500 v dc	913 3013 00
C103	CAPACITOR, CERAMIC: 5 uuf, ±5%, 5000 v dc	913 0840 00
C104	CAPACITOR, CERAMIC: 220 uuf, ±5%, 1000 v dc	913 3538 00
C106	NOT USED	
C107, C137	CAPACITOR, CERAMIC: 91 uuf, ±5%, 1000 v dc	913 3579 00
C108	CAPACITOR, CERAMIC: 82 uuf, ±5%, 1000 v dc	913 3578 00
C109	CAPACITOR, CERAMIC: 360 uuf, ±5%, 1000 v dc	913 3584 00
C110	CAPACITOR, CERAMIC: 820 uuf, ±5%, 1000 v dc	913 3586 00
C111	CAPACITOR, MICA: 5 uuf, ±10%, 500 v dc	912 2751 00
C112	CAPACITOR, VARIABLE, CERAMIC: 8 to 75 uuf, 350 v dc	917 1075 00
C115	CAPACITOR, CERAMIC: 1 uuf, ±25%, 5000 v dc	913 3703 00
C116	CAPACITOR, CERAMIC: 150 uuf, ±10%, 500 v dc	913 3705 00
C118	CAPACITOR, CERAMIC: 1000 uuf, ±20%, 5000 v dc	913 0101 00
C119	NOT USED	
C120	CAPACITOR, VARIABLE, AIR: 32 uuf min. to 241 uuf max	920 0137 00
C121	CAPACITOR, VARIABLE, AIR: 29 uuf min. to 700 uuf max	920 0150 00
C124	NOT USED	
C126	NOT USED	
C127, C143	CAPACITOR, CERAMIC: 0.0015 uf, ±20%, 6000 v dc	913 3539 00
C134	CAPACITOR, MICA: 33 uuf, ±10%, 500 v dc	912 2781 00
C136	NOT USED	
C138	CAPACITOR, CERAMIC: 180 uuf, ±5%, 1000 v dc	913 3581 00
C139	CAPACITOR, CERAMIC: 220 uuf, ±5%, 1000 v dc	913 3582 00
C146, C148, C149	CAPACITOR, CERAMIC: 1000 uuf, ±5%, 1000 v dc	913 3587 00
C147	CAPACITOR, CERAMIC: 510 uuf, ±5%, 1000 v dc	913 3585 00
CR101 A & B	DIODES: matched; type 1N34A	544 6886 00
E101, E102	SWITCH SECTION, ROTARY: 1 moving contact, 7 fixed contacts, 1 pole, phenolic insulation	269 2036 00
J101, J102	JACK, TIP: accommodates 1/8 in. plug; ceramic insulation; brass contacts	360 0088 00
J103	CONNECTOR, RECEPTACLE: 1 female contact; panel mtg; straight shape	357 9003 00
K101	RELAY, ARMATURE: 2C; 10 amps, 115 v ac or 26.5 v dc; 55 ohms coil	970 1922 00
K102	SWITCH-THERMAL OVERLOAD, AIR LOSS PROTECTOR: (repair by replacement only)	545 3120 004
L101	COIL, RADIO FREQUENCY: silver plated copper wire 1/8 in. dia; 3 turns, 15/16 in. ID; 2 in. lg approx	544 6950 002
L102	COIL, RADIO FREQUENCY: 159 turns, single layer wound no. 27 AWG wire	540 7979 00
L103	COIL, RADIO FREQUENCY: single layer wound solenoid 56 uh inductance, 870 ma cur; 1.30 ohms	240 0191 00
L104	COIL, RADIO FREQUENCY: silver plated copper tubing 3/16 in. dia; 23 turns, 2-1/2 in. id	544 6915 002
L105	COIL, RADIO FREQUENCY: single layer wound; 44 uh, 600 ma; 7 mc to 35 mc	240 0137 00
L106, L107, L108	COIL, RADIO FREQUENCY: universal wound, 2 mh inductance, 100 ma cur; 50,000 ohms	240 0134 00
L109	COIL, RADIO FREQUENCY: silver plated copper tubing 3/16 in. dia; 3 turns, approx 2-1/8 in. lg	544 6900 002
L110	COIL, RADIO FREQUENCY: 5 turns, single layer wound, no. 20, 0.28-0.45 uh	544 6999 003
L111	COIL, RADIO FREQUENCY: 6 turns, single layer wound, no. 20, 0.35 to 0.6 uh	544 6998 003
L112	COIL, RADIO FREQUENCY: 7 turns, single layer wound, no. 0.7 to 1.1 uh	544 7002 003
L113	COIL, RADIO FREQUENCY: 11 turns, single layer wound, no. 20, .9 to 1.5 uh	544 7001 003
L114	COIL, RADIO FREQUENCY: 19 turns, no. 22, 1.9 to 3.1	544 7000 003
L115	COIL, RADIO FREQUENCY: 11 turns, no. 20, 1.8 uh	545 7814 00
L116	P/O Z101	
MP101 MP108	PULLEY: steel, 1 "U" shaped groove, 1.625 in. od; brass hub 1/4 in. id	544 6949 002
MP102	DRUM, LOADING, PRESSED: aluminum; 0.250 in. id by 1-5/8 in. od by 1 in. lg; incls 1 pin spring 1/2 in. lg	544 6962 002
MP103	DRUM TUNING, PRESSED: aluminum, 0.250 in. id, 1-3/8 in. od, 7/8 in. lg incl 1 pin spring 1/2 in. lg	544 6964 002
MP104	PULLEY: steel, 1 "U" shape groove; 1.625 in. od; 1 brass hub, 0.188 in. id	544 6899 002
MP105	PULLEY: steel, 1 "U" shape groove; 0.375 in. id, by 2.125 in. od by 1/4 in. thk	281 0054 00
MP106, MP107	PULLEY: steel, 1 "U" shape groove; 0.375 in. id, by 3 in. od by 11/32 in. thk	281 0019 00
O101, O102	KNOB: pointer shape, black phenolic, white markings, 1-5/8 in. w, 29/32 in. lg, overall	544 0777 004
O103, O104	KNOB: round fluted shape, black phenolic, 2.078 in. dia, 0.858 in. w w/skirt	544 0784 003
P101, P102	PLUG, TIP: phono type; 1 terminal; 1-1/4 in. lg Cinch Mfg Corp mfg part no. 14H8171	361 0062 00
R101, R102	RESISTOR, FILM: 38,300 ohms, ±1%, 1/4 w	705 7172 00
R103	RESISTOR, COMPOSITION: 22 ohms, ±10%, 1 w	745 3282 00
R104	RESISTOR, COMPOSITION: 1000 ohms, ±10%, 1 w	745 3352 00
R105	RESISTOR, VARIABLE: ww 100k	376 3275 00
R106	Resistor, VARIABLE: wire wound; 500 ohms, ±10%, 2 w, linear, 7/8 in. slotted shaft	750 0510 00
S101	INTERLOCK ASSEMBLY UPPER: c/o the following	544 6879 00
	SPRING HELICAL COMPRESSION: CRES wire, 1-5/8 in. free length	
	SHAFT: CRES, 1/4 in. dia by 4-1/16 in. lg	544 6924 002
	DISC, SHORTING: brass, 1/16 in. thk, 0.406 in. id, 3/4 in. radius	544 6925 002
	INSULATOR, SWITCH: phenolic, 0.255 in. id, 3/4 in. radius, 3/16 in. thk	544 6926 002
	CLAMP ASSEMBLY TUBE:	544 6967 002
	COLLAR: aluminum setscrew type, 0.250 in. id, 1/2 in. od	
	BRACKET: aluminum, 0.064 in. thk, 1-1/4 in. by 2-3/16 in. by 4 in.	544 6989 003

ITEM	DESCRIPTION	COLLINS PART NUMBER
	BRACKET: aluminum, 0.064 in. thk, 1-1/4 in. by 2-3/16 in. by 4 in. three clinch nuts 4-40 pressed into bracket	544 6990 003
S102	SWITCH SECTION, ROTARY: 1 moving contact, 7 fixed contacts, 1 pole, phenolic insulation	269 2036 00
S103	SWITCH, PUSH: spst, normally open; 0.25 amp, 250 v ac	260 2548 00
S104	SWITCH, ROTARY: 4 fixed, 1 moving contact	544 6988 003
T101	TRANSFORMER, POWER, STEP-DOWN: primary winding 105 v, secondary winding, 6.0 v; 50/60 cps	662 0354 00
T102	TRANSFORMER, AUDIO FREQUENCY: pri, 10,000 ohms, 0 amp; sec. 10,000 ohms, 0 amp	667 0344 00
T103	TRANSFORMER POWER STEP-DOWN: primary winding,105 v; secondary winding,0.5 v; 50/60 cps; 7 amps	662 0427 00
V101	ELECTRON TUBE: tetrode type 4CX1000A	256 0123 00
XV101	SOCKET, ELECTRON TUBE: used with tube type 4CX1000A	220 1341 00
Z101	SUPPRESSOR, PARASITIC: 2 turns of no. 20 AWG wire inductance, 22 ohms resistance, 1 watt, incl L116	544 6876 00
	DIAL CABLE: 7 strands stainless steel 0.012 in. dia. nylon coated (specify feet on order)	432 1009 00
	Lower Cabinet	544 6874 00
C201, C202, C212, C213, C214, C215, C216, C217, C218	CAPACITOR, CERAMIC: 10,000 uuf, +100% -20%, 500 v dc	913 3013 00
C203	CAPACITOR, ELECTROLYTIC: 150 uf, +40% -10%, 150 v dc	183 1560 00
C204	CAPACITOR, ELECTROLYTIC: 40 uf, +40% -10%, 350 v dc	183 1559 00
C205	CAPACITOR: 1500 v dc, 0.5 uf, ±10%, mtg bracket	541 5657 004
C206	CAPACITOR, PAPER: 0.15 uf, ±10%, 5000 v dc	930 0035 00
C207, C208	CAPACITOR, PAPER: 4 uf, ±20%, 3000 v dc	930 4314 00
C209, C210	CAPACITOR, ELECTROLYTIC: 50 uf, +100% -10%, 150 v dc	183 1045 00
C211	CAPACITOR, ELECTROLYTIC: dual section, 250 uf ea.; +40% -10%, 25 v dc ea. section	183 1480 00
C219	CAPACITOR, PAPER: 0.1 uf, ±10%, 400 v dc	931 0299 00
C220	CAPACITOR, ELECTROLYTIC: 10 uf, +100% -10%, 25 v dc	183 1033 00
C221	CAPACITOR, CERAMIC: 0.01 uf guaranteed. minimum value	913 3522 00
C251, C252, C253, C254, C255, C256, C257, C258	CAPACITOR, DISC CERAMIC: 0.001 uf, ±20%, 1000 v dc	913 3742 00
C259	CAPACITOR, CERAMIC: -0.0015 uf, ±20%, 6000 v dc	913 3539 00
CR201, CR202, CR203, CR024, CR212, CR213, CR214, CR215	DIODE: silicon type 1N1492	353 1661 00
CR205, CR207, CR208	RECTIFIER, SELENIUM: 15 ma	353 0153 00
CR206, CR209	DIODE: silicon type 1N1084	353 1567 00
CR210, CR211	DIODE: germanium type 1N34A	353 0103 00
DS201, DS202, DS203	LAMP, INCANDESCENT: 6.3 v, 0.945 w, 0.15 amps; 1-1/8 in. lg max overall	262 3240 00
DS204, DS205	LIGHT, INDICATOR: supplied with lens, miniature bayonet base T-3-1/4 bulb (DS204 p/o M201; DS205 p/o M202)	262 0626 00
F201	FUSE, CARTRIDGE: 3.2 amps, 125 v dc; ferrule terminal	264 0216 00
F202, F203	FUSE, CARTRIDGE: 10 amps, 250 v dc; ferrule terminal	264 0396 00
F204	FUSE, CARTRIDGE: 8 amps, 250 v dc; ferrule terminal	264 0395 00
F205	FUSE, CARTRIDGE: 1 amp, 250 v dc; time delay	264 4280 00
J201, F202, J203	JACK, TIP: ceramic insulation, brass contacts, accommodates phono plugs Cinch Mfg Corp part no. 1336	360 0088 00
J204	CONNECTOR, RECEPTACLE: 3 female contacts; 15 amps, 125 v dc; panel mtg	368 0115 00
K201	RELAY: 1C. 15 amps. 115 v ac or 26.5 v dc	970 1921 00
K202	RELAY, THERMAL: spst; 3 amps at 450 v ac or dc; heater, 117 v ac or dc	402 0331 00
K203	RELAY: 2A, 15 amps, 110 v ac & 2A, 1 amp, 110 v ac	970 1937 00
K204	RELAY: 1B, 2 amps, 115 v ac	970 1936 00
K205	RELAY: 2C, 2 amps, 175 w, 2-30 mc	970 1925 00
K206	RELAY: 1C, 1 amp, 28 v dc or 115 v ac	408 1074 00
L201	REACTOR: 3.5 hy; 500 ma; 40 ohms resistance	668 0356 00
L202	REACTOR: 8 hy; 500 ma; 45 ohms resistance	668 0355 00
L203	COIL, RADIO FREQUENCY: choke; 2.0 uh, ±10% at 350 kc	240 0084 00
M201	AMMETER: panel mtg; dc; 200-0-500 ua	458 0483 00
M202	AMMETER: panel mtg; dc; 0-1 amp	458 0484 00
R201, R215	RESISTOR, WIREWOUND: 8.2 ohms, ±10%, 100 w	710 2026 00
R202	RESISTOR, COMPOSITION: 470 ohms, ±10%, 2 w	745 5638 00
R203	RESISTOR, WIREWOUND: 5000 ohms, ±10%, 25 w	710 3542 00
R204	RESISTOR, WIREWOUND: 10.1 ohms, ±3%, 7 w	746 9186 00
R205, R206, R207	RESISTOR, WIREWOUND: 18,000 ohms, ±10%, 100 w	710 2133 00
R208	NOT USED	
R209	RESISTOR, FILM: 806 ohms, ±1%, 1/2 w	705 7779 00
R210	RESISTOR, COMPOSITION: 1000 ohms, ±5%, 2 w	745 5651 00
R211, R212, R213, R214, R229	RESISTOR, COMPOSITION: 1.0 megohm, ±5%, 2 w	745 5777 00
R216	NOT USED	
R217	RESISTOR, COMPOSITION: 0.20 megohms, ±5%, 1/2 w	745 1448 00
R218	RESISTOR, COMPOSITION: 2200 ohms, ±10%, 1 w	745 3366 00
R219	RESISTOR, VARIABLE, WIREWOUND: 5000 ohms, ±10%, 2 w	377 0305 00
R220	RESISTOR, COMPOSITION: 3300 ohms, ±10%, 1 w	745 3373 00
R221	RESISTOR, COMPOSITION: 1000 ohms, ±5%, 1/2 w	745 1351 00
R222, R223	RESISTOR, WIREWOUND: 10 ohms, ±5%, 12 w	747 1114 00
R224	NOT USED	
R225	RESISTOR, COMPOSITION: 56 ohms, ±10%, 2 w	745 5600 00
R226	RESISTOR, FILM: 10,000 ohms, ±1%, 2 w	705 4009 00
R227	RESISTOR, FILM: 1000 ohms, ±1%, 1/4 w	705 7096 00
R228	RESISTOR, FILM: 13,700 ohms, ±1%, 1/4 w	705 7308 00
R230	RESISTOR, WIREWOUND: 35 ohms, ±10%, 25 w	735 0204 00
R231	RESISTOR, COMPOSITION: 47,000 ohms, ±10%, 1 w	745 3422 00
R232	RESISTOR, WIREWOUND: 15,000 ohms, ±10%, 7 w	710 9001 00
R233	RESISTOR, WIREWOUND: 8.2 ohms, ±10%, 100 w	710 2026 00
R234	RESISTOR, COMPOSITION: 47 ohms ±10% 2 w	745 5030 00
S201	SWITCH, TOGGLE: 4 pdt; 125 v ac at 20 amps, 30 v dc at 30 amp	266 0072 00
S202	SWITCH, TOGGLE: spst; 250 v ac 3 amps	260 2613 00
S203	SWITCH, PUSH: spst, normally open; 0.5 amps at 250 v ac; black button marked "on"	260 2696 00
S204	NOT USED	
S205	SWITCH, PUSH: spst, normally open; 0.25 amps, 250 v ac	260 2548 00
S206	HIGH VOLTAGE SHORTING SWITCH: c/o the following	
	Tip (qty 1)	200 1421 00
	Disc Shorting (qty 1)	544 6905 002
	Insulator (qty 1)	544 6906 002
	Shaft (qty 1)	544 6918 002
	Plate (qty 1)	544 6919 002
	Spring-Compression (qty 1)	544 6922 002
S207	SWITCH, ROTARY: 3 pole, 6 positions, 2 sections; 1 moving and 7 fixed contacts	259 1027 00
S208	SWITCH, PUSH: spst; normally closed; 0.5 amps at 250 v ac; red button marked "off"	260 2697 00
T201	TRANSFORMER, POWER, STEP-UP: 2 pri. 115 v ea; sec. 1, 6320 v, CT, sec. 2, 245 v; 50/60 cps	662 0351 00
T202	TRANSFORMER; POWER, STEP-DOWN: pri 115 v; sec. 2.5 v, CT; 50/60 cps	662 0352 00
T203	TRANSFORMER, POWER, STEP-DOWN & STEP-UP: pri 115 v; sec. 1, 12.6 v; sec. 2, 125 v, CT; 50/60 cps	662 0353 00
V201, V202	ELECTRON TUBE: type 866A/866	256 0049 00
V203	ELECTRON TUBE: twin diode; type 12AL5	255 0197 00

HOOK-UP WIRE CODE

The characteristics of the hook-up wire used in this equipment are indicated by groups of symbols on the diagrams. Each symbol group consists of a maximum of three letters followed by a maximum of three numerals. When three letters are used the first indicates the type of wire, the second represents the size of wire, and the third is the letter "S", used only when the wire is shielded. When two letters are used, the first and second letters indicate either the type and size of wire or the size of wire and shielding, respectively. When one letter is used it indicates the wire size only. The first numeral indicates the color of the wire body and the second and third numerals, if any, represent the colors of tracers, all numerals being in accordance with the standard EIA and MIL-W-16878 color code.

The symbols are assigned according to the following table.

TYPE OF WIRE CODE	
LETTER	TYPE OF WIRE
A	Cotton Braid Over Plastic (Formerly AN-J-C-48)
B	Busbar, Round Tinned
C	MIL-W-16878 Type B (#20 and Larger) (600 Volts)
D	Miniature Wire, MIL-W-16878 Type B (#22 and Smaller)
E	
F	Extra Flexible Varnished Cambric
G	
H	Kel-F (Monochlorotrifluoroethylene)
J	
K	Neon Sign Cable (15,000 Volts)
L	Silicone
M	
N	Single Conductor Stranded (Not Rubber Covered)
P	Single Conductor Stranded (Rubber Covered)
Q	
R	MIL-W-16878 Type C (1000 Volts)
T	Teflon, MIL-W-16878 Type E (600 Volts)
V	MIL-W-16878 Type D (3000 Volts)
W	Teflon, MIL-W-16878 Type EE (1000 Volts)
X	
Y	
Z	Acetate Yarn, Telephone Type

SIZE OF WIRE CODE	
LETTER	SIZE
A	#22 AWG
B	#20
C	#18
D	#16
E	#14
F	#12
G	#10
H	#8
J	#6
K	#4
L	#2
M	#1
N	#0
P	#00
Q	#000
R	#0000
T	#28
V	#26
W	#24
X	#19
Y	#30
Z	

COLOR CODE	
NUMBER OR LETTER	COLOR
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray (Slate)
9	White
a	Clear
b	Tan
c	Pink
d	Maroon
e	Light Green
f	Light Blue

EXAMPLES

MIL TYPE C, #22AWG, UNSHIELDED WIRE, WHITE WITH RED AND GREEN TRACERS:

R	A	9	25	4-1/4
Type of Wire	Size of Wire	Color of Body	Color of Tracers --	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE C, #16AWG, SHIELDED WIRE (SINGLE), WHITE WITH RED AND GREEN TRACERS:

R	D	S	9	25	4-1/4
Type of Wire	Size of Wire	Shielded	Color of Body	Color of Tracers --	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE B, #22AWG, SHIELDED WIRE (MULTIPLE), WHITE, AND WHITE WITH RED TRACER:

D	A	S	(9)	(92)	4-1/4
Type of Wire	Size of Wire	Shielded	First Conductor	Second Conductor --	Length of Wire in Inches (Includes Stripping & Tinning)

COLLINS RADIO COMPANY

HOOK-UP WIRE CODE

The characteristics of the hook-up wire used in this equipment are indicated by groups of symbols on the diagrams. Each symbol group consists of a maximum of three letters followed by a maximum of three numerals. When three letters are used the first indicates the type of wire, the second represents the size of wire, and the third is the letter ''S'', used only when the wire is shielded. When two letters are used, the first and second letters indicate either the type and size of wire or the size of wire and shielding, respectively. When one letter is used it indicates the wire size only. The first numeral indicates the color of the wire body and the second and third numerals, if any, represent the colors of tracers, all numerals being in accordance with the standard EIA and MIL-W-16878 color code.

The symbols are assigned according to the following table.

TYPE OF WIRE CODE	
LETTER	TYPE OF WIRE
A	Cotton Braid Over Plastic (Formerly AN-J-C-48)
B	Busbar, Round Tinned
C	MIL-W-16878 Type B (#20 and Larger) (600 Volts)
D	Miniature Wire, MIL-W-16878 Type B (#22 and Smaller)
E	
F	Extra Flexible Varnished Cambric
G	
H	Kel-F (Monochlorotrifluoroethylene)
J	
K	Neon Sign Cable (15,000 Volts)
L	Silicone
M	
N	Single Conductor Stranded (Not Rubber Covered)
P	Single Conductor Stranded (Rubber Covered)
Q	
R	MIL-W-16878 Type C (1000 Volts)
T	Teflon, MIL-W-16878 Type E (600 Volts)
V	MIL-W-16878 Type D (3000 Volts)
W	Teflon, MIL-W-16878 Type EE (1000 Volts)
X	
Y	
Z	Acetate Yarn, Telephone Type

SIZE OF WIRE CODE	
LETTER	SIZE
A	#22 AWG
B	#20
C	#18
D	#16
E	#14
F	#12
G	#10
H	#8
J	#6
K	#4
L	#2
M	#1
N	#0
P	#00
Q	#000
R	#0000
T	#28
V	#26
W	#24
X	#19
Y	#30
Z	

COLOR CODE	
NUMBER OR LETTER	COLOR
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray (Slate)
9	White
a	Clear
b	Tan
c	Pink
d	Maroon
e	Light Green
f	Light Blue

EXAMPLES

MIL TYPE C, #22AWG, UNSHIELDED WIRE, WHITE WITH RED AND GREEN TRACERS:

R	A	9	25	4-1/4
Type of Wire	Size of Wire	Color of Body	Color of Tracers --	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE C, #16AWG, SHIELDED WIRE (SINGLE), WHITE WITH RED AND GREEN TRACERS:

R	D	S	9	25	4-1/4
Type of Wire	Size of Wire	Shielded	Color of Body	Color of Tracers --	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE B, #22AWG, SHIELDED WIRE (MULTIPLE), WHITE, AND WHITE WITH RED TRACER:

D	A	S	(9)	(92)	4-1/4
Type of Wire	Size of Wire	Shielded	First Conductor	Second Conductor --	Length of Wire in Inches (Includes Stripping & Tinning)

COLLINS

COLLINS RADIO COMPANY

HOOK-UP WIRE CODE

The characteristics of the hook-up wire used in this equipment are indicated by groups of symbols on the diagrams. Each symbol group consists of a maximum of three letters followed by a maximum of three numerals. When three letters are used the first indicates the type of wire, the second represents the size of wire, and the third is the letter "S", used only when the wire is shielded. When two letters are used, the first and second letters indicate either the type and size of wire or the size of wire and shielding, respectively. When one letter is used it indicates the wire size only. The first numeral indicates the color of the wire body and the second and third numerals, if any, represent the colors of tracers, all numerals being in accordance with the standard EIA and MIL-W-16878 color code.

The symbols are assigned according to the following table.

TYPE OF WIRE CODE	
LETTER	TYPE OF WIRE
A	Cotton Braid Over Plastic (Formerly AN-J-C-48)
B	Busbar, Round Tinned
C	MIL-W-16878 Type B (#20 and Larger) (600 Volts)
D	Miniature Wire, MIL-W-16878 Type B (#22 and Smaller)
E	
F	Extra Flexible Varnished Cambric
G	
H	Kel-F (Monochlorotrifluoroethylene)
J	
K	Neon Sign Cable (15,000 Volts)
L	Silicone
M	
N	Single Conductor Stranded (Not Rubber Covered)
P	Single Conductor Stranded (Rubber Covered)
Q	
R	MIL-W-16878 Type C (1000 Volts)
T	Teflon, MIL-W-16878 Type E (600 Volts)
V	MIL-W-16878 Type D (3000 Volts)
W	Teflon, MIL-W-16878 Type EE (1000 Volts)
X	
Y	
Z	Acetate Yarn, Telephone Type

SIZE OF WIRE CODE	
LETTER	SIZE
A	#22 AWG
B	#20
C	#18
D	#16
E	#14
F	#12
G	#10
H	#8
J	#6
K	#4
L	#2
M	#1
N	#0
P	#00
Q	#000
R	#0000
T	#28
V	#26
W	#24
X	#19
Y	#30
Z	

COLOR CODE	
NUMBER OR LETTER	COLOR
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray (Slate)
9	White
a	Clear
b	Tan
c	Pink
d	Maroon
e	Light Green
f	Light Blue

EXAMPLES

MIL TYPE C, #22AWG, UNSHIELDED WIRE, WHITE WITH RED AND GREEN TRACERS:

R	A	9	25	4-1/4
Type of Wire	Size of Wire	Color of Body	Color of Tracers --	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE C, #16AWG, SHIELDED WIRE (SINGLE), WHITE WITH RED AND GREEN TRACERS:

R	D	S	9	25	4-1/4
Type of Wire	Size of Wire	Shielded	Color of Body	Color of Tracers --	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE B, #22AWG, SHIELDED WIRE (MULTIPLE), WHITE, AND WHITE WITH RED TRACER:

D	A	S	(9)	(92)	4-1/4
Type of Wire	Size of Wire	Shielded	First Conductor	Second Conductor --	Length of Wire in Inches (Includes Stripping & Tinning)

HOOK-UP WIRE CODE

The characteristics of the hook-up wire used in this equipment are indicated by groups of symbols on the diagrams. Each symbol group consists of a maximum of three letters followed by a maximum of three numerals. When three letters are used the first indicates the type of wire, the second represents the size of wire, and the third is the letter "S", used only when the wire is shielded. When two letters are used, the first and second letters indicate either the type and size of wire or the size of wire and shielding, respectively. When one letter is used it indicates the wire size only. The first numeral indicates the color of the wire body and the second and third numerals, if any, represent the colors of tracers, all numerals being in accordance with the standard EIA and MIL-W-16878 color code.

The symbols are assigned according to the following table.

TYPE OF WIRE CODE	
LETTER	TYPE OF WIRE
A	Cotton Braid Over Plastic (Formerly AN-J-C-48)
B	Busbar, Round Tinned
C	MIL-W-16878 Type B (#20 and Larger) (600 Volts)
D	Miniature Wire, MIL-W-16878 Type B (#22 and Smaller)
E	
F	Extra Flexible Varnished Cambric
G	
H	Kel-F (Monochlorotrifluoroethylene)
J	
K	Neon Sign Cable (15,000 Volts)
L	Silicone
M	
N	Single Conductor Stranded (Not Rubber Covered)
P	Single Conductor Stranded (Rubber Covered)
Q	
R	MIL-W-16878 Type C (1000 Volts)
T	Teflon, MIL-W-16878 Type E (600 Volts)
V	MIL-W-16878 Type D (3000 Volts)
W	Teflon, MIL-W-16878 Type EE (1000 Volts)
X	
Y	
Z	Acetate Yarn, Telephone Type

SIZE OF WIRE CODE	
LETTER	SIZE
A	#22 AWG
B	#20
C	#18
D	#16
E	#14
F	#12
G	#10
H	#8
J	#6
K	#4
L	#2
M	#1
N	#0
P	#00
Q	#000
R	#0000
T	#28
V	#26
W	#24
X	#19
Y	#30
Z	

COLOR CODE	
NUMBER OR LETTER	COLOR
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray (Slate)
9	White
a	Clear
b	Tan
c	Pink
d	Maroon
e	Light Green
f	Light Blue

EXAMPLES

MIL TYPE C, #22AWG, UNSHIELDED WIRE, WHITE WITH RED AND GREEN TRACERS:

R	A	9	25		4-1/4
Type of Wire	Size of Wire	Color of Body	Color of Tracers	--	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE C, #16AWG, SHIELDED WIRE (SINGLE), WHITE WITH RED AND GREEN TRACERS:

R	D	S	9	25		4-1/4
Type of Wire	Size of Wire	Shielded	Color of Body	Color of Tracers	--	Length of Wire in Inches (Includes Stripping & Tinning)

MIL TYPE B, #22AWG, SHIELDED WIRE (MULTIPLE), WHITE, AND WHITE WITH RED TRACER:

D	A	S	(9)	(92)		4-1/4
Type of Wire	Size of Wire	Shielded	First Conductor	Second Conductor	--	Length of Wire in Inches (Includes Stripping & Tinning)

COLLINS RADIO COMPANY